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FOREWORD

The title V report on Science, Technology, and American Diplomacy has been submitted by the President to the House Committees on Science and Technology and on Foreign Affairs in accordance with section 503 of Public Law 95–426. This report represents the sixth submission to the Congress.

The Congress intended that the report should reflect the range of U.S. activities involving science and technology and the interdependence of those activities with the overall U.S. foreign policy. This year's title V report illustrates the numerous U.S. Government agencies which are actively engaged in these activities such as the Department of State, the Office of Science and Technology Policy in the Executive Office of the President, as well as other departments and agencies. While the report adequately reflects the wide range of activities it does not, once again, adequately reflect the foreign policy implications and interdependence of rapidly increasing science and technology developments—that is, the inadequate discussion of the London Economic Summit, the oversimplified statements in the sections on multilateral cooperation in the OECD, NATO, et cetera, and finally the chapter on Japan appears to raise more questions than answers.

At the request of the committees, as in previous years, the Congressional Research Service of the Library of Congress has prepared an analysis of the contents of the report vis-a-vis the statutory requirements which form the basis for its submission. Unfortunately, as reflected in the CRS critique, this year's submission reflects a modicum of progress toward meeting those statutory requirements but as in the past, there remains continued deficiencies which the committees find to be unacceptable. The unexplained selectivity in reporting on the bilateral science agreements and the activities conducted under them, the uneveness of the financial data, and the continued inadequate treatment and evaluation of the foreign policy aspects of the report cannot be ignored. The committees urge that a concerted effort be made in the future by the executive branch to address these deficiencies, thereby avoiding the necessity of Congress to adopt legislative changes to redress the aforementioned problems.

We continue to believe that the report on Science, Technology and American Diplomacy serves a very important purpose in placing the spotlight on the significant role which science and technology plays in the conduct of our international relations, a role which is not always fully recognized. We therefore seek the widest possible attention to this report by Members of Congress and the American public through the issuance of this joint committee print.

The views expressed in this report are those of the executive branch and do not necessarily reflect the views of the members of the Committee on Science and Technology and the Committee on Foreign Affairs.

DON FUQUA,
Chairman, Committee on Science and Technology.

DANTE B. FASCELL,
Chairman, Committee on Foreign Affairs.

LETTER OF TRANSMITTAL

THE WHITE HOUSE,
Washington, DC, March 20, 1985.

To the Congress of the United States:

In accordance with Title V of the Foreign Relations Authorization Act for Fiscal Year 1979 (Public Law 95-426), I am transmitting the Administration's annual report on international activities in the fields of science and technology for Fiscal Year 1984. The report was prepared by the Department of State in cooperation with other relevant agencies, consistent with the intent of the legislation.

This Administration has recognized from the outset that the achievement of our most essential national goals—enhanced national security, increased industrial competitiveness, better health and quality of life for all our citizens—depends upon a strong and vital science and technology enterprise. In view of the impressive scientific and technological capabilities of many other countries, we are increasingly aware of the importance of international cooperation as a means of augmenting our strengths in these areas. The generation of new knowledge and progress in technology offer benefits to all nations committed to realistic and sustained economic growth. Indeed, the future of the world depends largely on science, technology, and the willingness of nations to marshal their greatest resources—human creativity and talent—to work together to solve the problems that challenge mankind. We in the United States are determined to help make that future a bright one.

Substantial efforts were made during 1984 to implement the Title V legislation. In June, Secretary of State Shultz addressed a message to all our embassies abroad stressing the central importance of science and technology as a critical element of our foreign policy. In September, he followed that with a request for detailed descriptions of each mission's specific plans to better integrate science and technology into the conduct of our foreign affairs.

Consistent with our foreign policy objectives, we continue to emphasize government-to-government scientific cooperation in our bilateral and multilateral relations, in particular, fostering our cooperative relationships with the nations of Western Europe, with Japan and other democratic nations of the Pacific Basin, with India and the People's Republic of China, and with friends in our own hemisphere.

During 1984, we continued to participate in several cooperative scientific projects agreed upon at the Williamsburg Economic Summit in June 1983 and endorsed at the London Economic Summit in June 1984. As in the past years, we stressed the ability

of cooperative efforts in science and technology to enhance the economic and military strength of the Western Alliance. We continue to support the NATO Science Committee's activities to stimulate collaborative research in significant frontier fields of science and to facilitate the exchange among member countries of their most promising young scientists and engineers. The importance the United States places on the NATO Science Committee was highlighted last Spring when we hosted the Committee's meeting in Washington.

During 1984, we continued to review our science and technology relationship with Japan. The U.S.-Japan Advisory Commission submitted a report to Prime Minister Nakasone and me entitled "Challenges and Opportunities in United States-Japan Relations." It suggested in particular that ". . . the time has come for a high-level review to determine possible improvements and new directions for mutually beneficial cooperation." Such review was launched in April, and I expect to be able to highlight its conclusions in my message accompanying next year's Title V report.

Last January, we reviewed the range of activities that have been carried out during the first five years of our Bilateral Cooperative Agreement in Science and Technology with the People's Republic of China, and took particular pleasure in extending that agreement for five more years. Cooperative research is now being conducted under twenty-three separate protocols within the broad auspices of that agreement, and accords in several new areas, including fossil energy, and space cooperation, are in the final stages of negotiation.

Signficant strides were made in the special cooperative programs with India—in health, agriculture, and monsoon research—that emerged from my discussions with Prime Minister Indira Gandhi in July 1982. The government of India continues its support of these initiatives under the new leadership of Prime Minister Rajiv Gandhi.

Special reference must be made to our bilateral science and technology relationship with the Soviet Union. In past reports, I have stressed that cooperation with that country depends upon steps taken by its government to comply with recognized standards of international behavior. While that behavior is often far from constructive, I have approved during 1984 renewed cooperative efforts in carefully selected areas such as agriculture, health, and environmental protection and safety, that recognize complementary strengths and ensure mutual benefits. I took this action to convince Soviet officials of our desire for peace and our willingness to explore whatever roads might be open to take us there together.

We recognize that there are important opportunities to address science and technology issues within the technical agencies of the United Nations system, but such opportunities should be pursued only where there are realistic expectations of shared benefit and success. Where success proves beyond our grasp, we must reevaluate our position and find more effective alternatives. Such is the case with our participation in UNESCO. I stated at the end of 1983 our intention to withdraw from that agency should acceptable reforms not be undertaken within a year. That period expired on December 31, 1984, and we have withdrawn as planned. Despite U.S.

withdrawal, we remain committed to the belief that genuine reform of UNESCO is a worthwhile goal, and in the coming year, we will work with all countries, individuals, and private organizations who seek improvement in UNESCO to achieve that purpose. When UNESCO returns ot its original mission and principles, we will rejoin UNESCO and participate in the full range of its multilateral scientific programs.

In conclusion, I want to stress again the importance of cooperative scientific and technological arrangements in our assistance to developing countries. On November 22, 1984, in an address to members of an international association for research and development in nuclear energy, His Holiness John Paul II emphasized the importance he perceives in such arrangements. "Cooperation in the fields of science and technology is one of the most effective means not only for contributing to the physical welfare of people, but also of fostering the dignity and worth of every person."

The United States is committed to a role for scientific and technological cooperation in international affairs, and we will pursue this goal to the benefit of all nations willing to join us.

RONALD REAGAN.

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PART I -SCIENCE AND TECHNOLOGY IN AMERICAN DIPLOMACY

CHAPTER 1 - SCIENCE AND TECHNOLOGY IN AMERICAN FOREIGN POLICY

The United States, as the most technologically advanced nation in the world, has long recognized the key role science and technology has played in bringing about prosperity at home. Experience has shown that there are significant benefits to be derived for the United States from scientific and technological cooperation with other nations. International cooperation in science and technology historically has been carried out primarily by private individuals and institutions. The role of government traditionally has been to encourage and provide support for cooperation based on the needs and interests of the American scientific and technical agencies.

Over the past several years the Department of State has been explicitly charged with coordinating the Administration's international scientific and technological activities and with ensuring that foreign policy considerations are appropriately taken into account.

As shown again during 1984, scientific and technological aspects have become increasingly important elements of international issues touching directly on our national security, well being, and quest for peace. Secretary of State Shultz directed attention to this development in May 1984 when he pointed out that "foreign policy issues may involve such S&T topics as nuclear power and non-proliferation, genetic engineering, agriculture, health, technology transfer, communications, and space research and exploration -- in short, factors profoundly affecting the quality and even the very continuation of our lives."

Many of these issues are science and technology-driven. Many are of a global nature and must be dealt with in a multilateral context, such as the preservation of the environment, the protection of marine resources, the management of international communications, the control of diseases, and the safeguarding of nuclear materials. Difficult as these issues are, they nevertheless offer perhaps the best prospects for convincing the world community that international cooperation is indispensable to the survival of mankind and nature.

Science and technology issues also play key roles in our bilateral relations with a large number of countries. This is self-evident concerning our immediate neighbors, Canada and Mexico, where direct environmental and other interactions

affect our daily lives. It is equally clear in our relations with the industrially developed countries, for whom scientific and technological issues are as vital to their prosperity as they are to the United States. These issues are also increasingly emerging as significant in our relations with developing countries, a growing number of which are seeking our cooperation to achieve an indigenous technological competence important for their development.

Cooperative science and technology arrangements continue to prove a useful tool in the enhancement of hemispheric relations with our neighbors in the Caribbean Basin and throughout Latin America. An example of this is the science and technology agreement signed in February 1984 with Brazil.

Science and technology cooperation with the People's Republic of China is perhaps the principal cornerstone in our strong bilateral relationship with the PRC. It is not surprising, therefore, that in 1984 once again U.S. activities with the PRC far exceeded all other bilateral science and technology activities carried out under a government-to-government program.

Even with countries with whom we have a strained or adversarial relationship, the United States has tried to maintain science and technology activities and arrangements to the greatest degree possible, both because we derive direct scientific benefit and because science and technology cooperation often offers the best prospect for improving relations generally. Examples of this in 1984 are developments in our relations wth the Soviet Union and Poland. With the U.S.S.R., several specialized agreements in the science and technology area were extended or renewed, high level contacts were re-established in the environmental field, and the President in June 1984 noted and supported U.S. initiatives to expand bilateral science and technology relations. With Poland, the U.S. in 1984 lifted sanctions on science and technology cooperation. Negotiations are scheduled for new agreements to replace the science and technology agreements which expired since 1981.

The Administration remains committed to international cooperation in science and technology, recognizes the important and inextricable role science and technology aspects play in a successful American diplomacy, and believes that its budget levels for FY 1985 are adequate for meeting our priority science and technology and foreign policy needs.

The remaining chapters in this report provide more detailed information on the role of science and technology in American foreign policy during 1984.

CHAPTER 2 - RESOURCES NECESSARY FOR SUCCESSFUL DIPLOMACY

The Department of State continues to carry out its central coordinating role in the formulation and implementation of our government's international S&T policy. The Department encourages international cooperation in science and technology by the technical agencies of the federal government and private sector institutions and works to ensure that such activities are consistent with foreign policy goals.

In May 1984, Secretary of State Shultz sent a personal message to all Chiefs of Mission at our overseas posts in which he endorsed the importance of S&T in U.S. foreign policy and his commitment to enhancing its impact in foreign affairs. The Secretary emphasized the seriousness he attaches to the responsibility which Congress assigned to him under Title V of the Foreign Relations Authorization Act of FY 1979. He urged the Chiefs of Mission, in turn, to take full advantage of the experience and insights offered by both full-time and part-time Science Officers, the vanguard of our S&T foreign relations.

In November 1984, Secretary Shultz sent a follow-up personal message to Chiefs of Mission requesting them to outline for him their plans, goals, and S&T objectives for fiscal year 1985, with special focus on the direct foreign policy impact that S&T had at their post. The Secretary informed the Chiefs of Missions that the State Department was now ready to move ahead on some measures to enhance the role of Science and Technology in the Department and throughout the Foreign Service.

Personnel Requirements

The Science Officer Program

The overseas Science Officers, both full-time specialists and part-time generalists, must play increasingly important and beneficial roles in the integration of S&T into foreign policy issues. The trend away from dealing primarily with issues of interest only to the scientific community to that of S&T-driven politico/economic issues continues unabated and at an accelerating pace. To keep up with this change in emphasis, there is a growing need for generalist Foreign Service Officers who are "literate" in science and technology. There has also developed a greater need for support and guidance from program management in Washington and coordination of contacts with technical agencies.

The Department's Bureau of Oceans and International Environmental and Scientific Affairs (OES) is taking the lead role in developing a long-term science officer program to meet new and anticipated needs and in developing the required personnel resources. A key component in this effort is to bring about a situation where the science function will be perceived as important by management and attractive to Foreign Service Officers. Efforts to achieve these objectives are actively under way, but much remains to be done before goals can be met. The support of top management has been demonstrated and there is increasing awareness that a sustained effort will be necessary.

Enhancement of the Science Officer Specialty

In coordination with the offices of the Department's central management system, OES has proceeded with its Action Plan, initiated in late 1983, to implement a large number of action items and administrative steps designed to strengthen and improve the integration of science and technology in the overall development of U.S. foreign policy and to promote the science officer specialty as an attractive and viable career option.

The main focus of this increasingly growing effort is to develop in the first instance an improved in-house science officer program through the establishment of more effective recruitment, training, assignment, and promotion processes; a general increase in science and technology "literacy" in the Foreign Service, and closer coordination between science officers and the technical agencies.

(Please also see the "Resources" part of this Chapter for further information on steps taken in 1984 in this area.)

Recruitment

Increasing emphasis will be placed in the future to recruit both full-time Science Counselors and Attaches and their part-time colleagues, the science reporting officers, whenever possible from the career Foreign Service. Science Officers are to be sought from outside the Foreign Service only in those few situations demanding clearly specialized background, where the position cannot be filled by qualified Foreign Service Officers. Such outside appointments of uniquely qualified individuals will generally be restricted to a temporary, non-career basis in order to avoid encouraging unrealistic or unrealizable aspirations or weakening the career structure of the Foreign Service S&T specialty.

Training

Science Training at the Foreign Service Institute (FSI)

Mid-Level Professional Development Program

Science and technology issues are covered in various elements of the FSI Mid-Level Program, which is a five month course designed to reach every Foreign Service Officer (FSO) who passes the tenure threshold. In addition to a general coverage of S&T issues within the context of overall foreign policy, one course (10 half days) is devoted specifically to "Issues in Technology and Resource Policy". This course includes such topics as population, food supply, energy, environmental pollution, and technology transfer. Two other short courses on political-military affairs examine nuclear and other technology issues as they relate to strategic policy and arms control, and of eight elective courses, one entitled "Energy and U.S. Foreign Policy", reviews energy resources, related technol- ogies, and energy policy in U.S. security and bilateral and multilateral relationships. Two other courses probe in greater depth questions of political-military affairs, including the role of technology in weapons development, strategy and tactics, verification, and military technology transfer. Contemporary scientific methods of political and economic analysis, including computer-assisted methods, are included in the functional training (about one-third of the Mid-Level course) given to officers specializing in political or economic affairs. Electives are offered in political analysis and political economy for officers who are not specialists in these areas. All Mid-Level students are offered hands-on intro- duction to computers and word processors.

Other Professional Development Programs

In the introductory course given to new Foreign Service Officers, the increasing impact of S&T in contemporary diplomatic practice is emphasized and science reporting functions introduced as part of the presentation on economic reporting. Senior officers participating in the 10 month Executive Seminar on National and International Affairs frequently examine S&T questions affecting domestic and world economic and military issues. Some individual research projects also focus on S&T issues. The Foreign Affairs Interdepartmental Seminar frequently includes units on current S&T aspects of international affairs and U.S. foreign policy.

Science Symposium Series

The S&T Center for the Study of Foreign Affairs sponsors a special Science and Technology Series in its symposia and conferences which bring academic and governmental experts together to discuss contemporary international issues. Topics in this series during 1984 were:

International Health and Nutrition (September 8)

International Climate Issues in Foreign Policy (November 16)

The Washington Science Community and the Foreign Affairs Agencies: Toward a Better Dialogue (January 25)

Space Policy: Foreign and Domestic Influence (April 30)

Robotics: Automated Manufacturing Issues and Foreign Affairs (May 9)

International Scientific Cooperation: Myth or Reality (November 13)

The Center expects to publish two books by the end of 1984, each containing reports on three symposia from the S&T series. The books will be titled 1) "Science, Technology and Foreign Affairs: Global Environment, Communications and Agriculture" and 2) "Science, Technology and Foreign Affairs: Climate, Scientific Dialogue and Health." A symposium will be held February 26, 1985 on S&T Reporting.

Regional Resource Officer Training

Once a year FSI arranges a one-month course for 2-4 FSOs who will assume significant minerals resource reporting responsibilities. The course, arranged in cooperation with the Department of Interior (DOI), involves one week of consultations with the U.S. Geological Survey and the Bureau of Mines in Washington, two weeks at the Colorado School of Mines to develop an understanding of the technical aspects of mining, and one week of training at regional offices of the DOI.

Ad-Hoc Energy Training

FSI, through the Department of Defense, arranges twice a year a one-week course on petroleum, including supply, physical limits and petroleum engineering, for FSOs who will assume petroleum reporting responsibilities. Interested FSOs can also enroll in the Department of Energy's short course on "The

Nuclear Fuel Cycle and Technical Aspects of Nuclear Weapons Proliferation." Science Officers particularly make frequent use of this opportunity to inform themselves before proceeding to post.

Science and Technology Component in Other FSI Courses

Other FSI courses include substantial discussion of S&T issues. The 26-week intensive economic/commercial studies course includes units on quantitative analysis, computer applications, and resource and environment issues. Where S&T issues are important to bilateral and regional affairs, they are considered in the FSI Area Studies courses. Several FSI shorter seminars (such as those on National Security and Arms Control and Intelligence and Foreign Policy) also address S&T issues.

Recent Developments

FSI, in consultation with the National Academy of Sciences (NAS), is developing a new course specifically on the role of science and technology in the conduct of foreign relations. This course will be included in the 5 month Mid-Level course discussed above. FSI and OES will also work together to develop an appropriate orientation program for FSOs whose overseas assignments include part-time science reporting duties. Through its Center for the Study of Foreign Affairs, FSI, together with OES and NAS, is also working on preparation of a joint symposium on Teaching About the Role of Science and Technology in Foreign Affairs.

University and Other Outside Training

FSI continues to offer one-year university training assignments in science and technology and in systems analysis.

Advisory Committee

The Department of State's Advisory Committee on Oceans and International Environmental and Scientific Affairs is currently composed of 25 private individuals who are expert in the areas of its concern and who travel to and attend meetings in Washington at their own expense. The Committee met twice in FY 1984 under the Chairmanship of James L. Malone, Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs. At the December 5, 1983 session, topics discussed included: the American policy for commercialization of U.S. Government outer space activities; the acid rain dilemma; population policy developments; the Non-Proliferation Treaty Review Conference, and the Reciprocating States

Agreement on seabeds mining. At the June 21, 1984 meeting, the Committee considered the London Dumping Convention; the UN Environmental Program; the World Population Conference and outer space commercialization.

Science Officer Conferences

A world-wide Science Officer Conference was held in Vienna, Austria, August 28-30, 1984. Science Counselors and Attaches and part-time science reporting officers from 43 posts on four continents attended. Agencies represented at the conference were the White House Office of Science and Technology Policy, the National Institutes of Health, DOE, NASA, NOAA, NBS, NRC, NSF and the OES and Personnel Bureaus of the State Department. Staff members of the Subcommittee on International Security and Scientific Affairs of the House Foreign Affairs Committee also attended the Conference. OES Assistant Secretary Malone, Deputy Assistant Secretary Harry Marshall and other Washington representatives briefed the officers on overall S&T policy and specific developments in such fields as outer space, health and environment, population, non-proliferation and energy technology, oceans and fisheries, and bilateral S&T cooperation.

A major focus of the conference was extensive discussion of progress to date in implementing the OES Plan of Action to better integrate S&T in the foreign policy-making process and to enhance S&T as a career for foreign service officers. Participants also visited UN headquarters in Vienna where they were provided a policy overview of the USMission. They were also thoroughly briefed by senior staff of the International Atomic Energy Agency on the structure and role of that agency, particularly in regard to safeguards.

OES Science and Technology Newsletter

The OES Bureau prepares a monthly Science and Technology Newsletter containing articles on significant activities and U.S. Government policy developments in S&T. During FY 84, the Newsletter, usually with enclosures of important policy speeches or technical papers, was distributed to 124 diplomatic posts overseas, as well as to Congressional members and staff and members of the international S&T community.

OES Activities in Support of Science Officers

The Office of Science and Technology Support in OES traditionally acts as the back-stopping unit for Science Officers in the field. This office provides a "home" for the Science Officers during their preparations for departure

overseas or periodic consultations in Washington, making available office space, suggesting and arranging calls on counterparts in the Department and Technical Agencies, arranging for orientation or training, such as the DOE Nuclear Fuel Cycle course, and meeting special needs of Science Officers for information or assistance.

During 1984 Science Officers were provided with a list describing the functions and responsibilities of all OES professional personnel. Another list was made available giving them useful contacts at all of the Technical Agencies, facilitating direct contact and saving precious time.

In 1984, OES also canvassed all the technical agencies to determine which publications and reports could be made available to Science Officers. The response was very positive and gratifying, and a system has now been set up to provide Science Officers with extensive S&T informational materials, in addition to the monthly OES Science and Technology Newsletter. This new support activity will help increase S&T "literacy" and also serve as a useful aid for contacts with host country counterparts.

Resources

In 1984, thirty-five full-time Science Counselors and Attaches worldwide carried out the bulk of the Department's overseas diplomatic activities in the S&T area. Of these, 26 were State Department funded positions which cost an estimated $2.5 million. Numbers and funding are expected to increase moderately in FY 1985. During FY 1984, the position of Science Attache was established at the American Embassy in Pretoria, South Africa. In addition, part-time Science Reporting Officers were designated at 104 Foreign Service posts.

Developments During 1984

Examples of other steps that have been taken or initiated in 1984 in the Resources area include identification of part-time Science Officer positions with significant (20-25%) S&T components; establishment of a reporting evaluation and feedback system; identification of developmental positions in the Department for Science Officers; analyses of S&T manpower needs and resources, and increased coordination with Career Counselors.

In November 1984 OES Assistant Secretary Malone, in a message to Chiefs of Missions abroad, shared specific steps which have been useful at other posts in enhancing the utilization of full-time Science Officers, urging that they be implemented as appropriate. As part of the on-going effort to maximize the utilization of all resources, the Chiefs of Mission at posts with only part-time Science Officers were asked to examine the situation at their post to determine if S&T matters will require 20-25 percent of a work year. Where this is the case, such positions will be designated as having an S&T content and this requirement will be incorporated into the position description. This will permit systematic efforts to: assign to such positions officers with S&T interests and backgrounds; provide adequate orientation, training, and consultations before an officer departs for post; institute appropriate informational back-stopping tailored to the officer's individual needs while at post, and assist officers with future assignments by ensuring proper credit for the S&T experience gained. These steps are part of the OES Action Plan intended to broaden backgrounds, enhance S&T literacy, and meet increasing demand for S&T skills.

OES established in 1984 a system by which it can have the proper input to assure that S&T reporting is given appropriate attention when annual post reporting plans are formulated. The system also includes analysis of S&T reporting from all posts. OES, in addition, contacted all major end-users of S&T reporting from the field, both within the State Department and at all the technical agencies, to encourage them to provide feedback on useful reporting. Only with such feedback can Science Officers know whether their reporting has value and is worth the considerable time spent on it.

During 1984 a start was made on the process of identifying positions in OES and other bureaus of the Department suitable as developmental assignment positions for Science Officers. Initial analyses were also carried out within OES on S&T manpower needs and resources for the next three years, with more detailed five-year projections under study by the Department's central personnel system. Concurrent with the establishment of the new system for part-time Science Officers with significant S&T job content and as another effort under the Action Plan, OES has instituted organized and increased coordination and consultation with the Department's Career Counselors to assure that they are aware of needs and opportunities for Science Officers.

SCIENCE COUNSELORS/ATTACHES

Below is a list of Science Counselors and Attaches as of October 1, 1984:

POST	INCUMBENT	TITLE
EUROPE		
Ankara	Robert Aitken	Counselor
Belgrade	Sidney Smith	Attache
Bonn	Robert Morris	Counselor
Brussels (EC)	John Fry	Counselor
Geneva (UNEUR)	Gordon Cartwright	Science Liaison Officer
London	Robert Stella	Counselor
Madrid	Francis Kinnelly	Attache
Moscow	John Salmon	Counselor
Ottawa	Addison E. Richmond, Jr.	Counselor
Paris	John Boright	Counselor
Paris (UNESCO)	Manfred Cziesla	Counselor
Paris (OECD)	Thomas Wajda	Counselor
Paris (EPA)	Jack Fitzgerald	Attache
Paris (DOE)	Andrew Reynolds	Attache
Paris (NASA Rep.)	Richard Barnes	Attache
Rome	Lawrence Finch	Counselor
Stockholm	Robert Goeckermann	Counselor
Vienna (IAEA)	Stanley Fraley	Attache
Vienna (IAEA)	Peter Brush	Counselor
Vienna (IAEA)	Richard Getzinger	Attache
Warsaw	- vacant -	Attache
LATIN AMERICA		
Brasilia	Frederick Vaznaugh	Counselor
Buenos Aires	Gerald Whitman	Counselor
Mexico, D.F.	-vacant-	Counselor
Mexico, D.F.	Jeffrey Lutz	Attache
Mexico, D.F.	Charles Finan	Fisheries Officer/Attache
NEAR EAST AND SOUTH ASIA		
Cairo	Robert Carr	Counselor
New Delhi	S. Ahmed Meer	Counselor
	Philip Schambra	Asst. Attache
Tel Aviv	Leroy Simpkins	Attache

EAST ASIA AND PACIFIC

Beijing	Jack Gosnell	Counselor
Seoul	Jerome Bosken	Attache
Tokyo	Gerry Helfrich	Counselor
Tokyo (NOAA)	John Gissberg	Fisheries Affairs/Attache
Tokyo (DOE)	Billy Hill	Attache

AFRICA

Pretoria	Guilbert Melese d'Hospital	Attache

State Department Domestic S&T Activities

The largest share of the Department of State's domestic science and technology activities is carried out and funded by the OES Bureau.

Below is a summary of OES personnel positions and the OES budget. Further details may be found in the Department's FY 1985 Budget Request.

OES Personnel Positions

1984 (Actual)	1985 (Estimate)
134	137

OES Funding (in thousands of dollars)

	1984 (Actual)	1985 (Estimate)
Executive direction and policy formulation	$ 466	$ 487
Conduct of diplomatic relations with foreign countries	6,041	6,333
Administrative and staff activities	425	439
BUREAU TOTALS:	$6,932	$7,259

Note: In addition to the funding above, $1,683,000 was appropriated in FY 1984 to provide for the continuing bilateral S&T agreement between the United States and Yugoslavia. The sum of $2,000,000, which was appropriated in FY 1982 for a proposed United States-Poland S&T agreement to replace a similar agreement that expired on December 31, 1981, has been deferred until such time as bilateral relations should improve sufficiently to resume negotiations and conclude a new agreement. The Congress made available these funds in FY 1985 to fund the first-year costs of the new five-year United States-Yugoslavia S&T agreement.

To fund U.S. participation in activities of twelve international fishery commissions funded through the OES-managed International Fisheries Commissions appropriation, $8,876,000 was appropriated in FY 1984 and $9,100,000 was appropriated for FY 1985.

Actions are currently underway to re-establish a cooperative science and technology program with Poland following improvements in the internal situation there and in bilateral relations. It is now anticipated that funding for first-year costs, currently estimated at $2,000,000, will be secured from FY 1986 appropriation and from the use of excess zlotys funded by special foreign currency appropriations of various U.S. technical agencies.

PART II - COMPREHENSIVE S&T PROGRAMS

CHAPTER 3 - SCIENCE AND TECHNOLOGY IN MULTILATERAL ORGANIZATIONS

The Summit Science and Technology Initiative

The London Summit Meeting of the Heads of State or Government of the United States, Canada, France, the Federal Republic of Germany, Italy, Japan, the United Kingdom, and the President of the Commission of the European Communities reaffirmed the importance of science and technology as an essential component of international cooperation and endorsed the Report on "Technology, Growth, and Employment" prepared by the Working Group established at the 1982 Versailles Summit meeting. During 1984, this Working Group, to which the U.S. representative is the President's Science Advisor, Dr. George Keyworth, met three times to reassess progress on the 18 international collaborative projects initiated during the last two years and to identify key science and technology issues which relate to economic growth and employment. The Working Group's Report to the London Summit examined the role of new technologies in stimulating economic growth, identified specific obstacles to the introduction of new technologies, addressed the topic of technology and the environment, and assessed progress in the 18 areas of cooperation. In addition to the above activities, the London Summit Declaration called on the Working Group to submit a report on environmental research priorities and opportunities for future industrial cooperation. To fulfill that mandate, the Working Group met three times in 1984 to undertake such a study and completed a report for presentation at the Bonn Summit.

The United States is the lead or co-lead country in six of the 18 collaborative S&T projects supported under the Working Group's auspices. The current status of these projects is summarized below.

Solar System Exploration (U.S. lead) - Under this project coordinated by the National Aeronautics and Space Administration (NASA), two primary areas of solar system exploration have been identified: solar terrestrial research and the study of planets and small bodies. NASA, the European Space Agency (ESA) and Japanese representatives of the planning group in the new International Solar Terrestrial Physics Program (ISTP) met twice this year to coordinate design studies of spacecraft and ground systems. Under this Summit project, three joint studies are underway concerning planetary and small bodies missions, a joint U.S.-Germany CRAF mission, a joint NASA-ESA mission to Saturn and its moon Titan, and a NASA-ESA study on primitive body missions.

Remote Sensing from Space (U.S. lead) - In 1984, under the guidance of the National Oceanic and Atmospheric Administration (NOAA), this project made substantial progress towards its objective of enhancing international collaboration in remote sensing activities. The project's panel members established a streamlined remote sensing coordination group which met in September and a group on meteorological satellite cooperation which met in November. In October, the countries involved in the satellite search and rescue program, COSPAS-SARSAT, signed an agreement which assures services through 1990. Discussions were also held regarding provision of new remote sensing instruments for flight on the shuttle or satellites. Also, plans are well underway for holding remote sensing training activities for developing countries.

High-Energy Physics (U.S. lead) - Under the leadership of Department of Energy (DOE), this project aims to further international cooperation in high-energy physics. During 1984, subgroups met to survey high energy physics plans and programs among Summit nations and to develop long-term, cooperative plans for construction and sharing of new, major facilities. Other groups assessed research underway in accelerator and detector technology areas and explored mechanisms for facilitating international collaboration.

Controlled Thermonuclear Fusion (U.S.-European Communities co-lead) - The objectives of this project under DOE guidance are to accelerate world development of a new energy source using inexhaustible fuels and possessing potential environmental advantages and to avoid duplication of costly facilities through joint collaboration. In 1984, subpanels met to identify and plan future facilities required to establish the feasibility of fusion, to identify near-term fusion physics and technology subjects for collaboration, and to explore reactor concept improvements.

Fast Breeder Reactor Design (U.S.-France co-lead) - Under DOE's purview, this project aims to provide a stable and supportive atmosphere for facilitating orderly breeder development, In 1984, expanded governmental understandings were reached within Europe for breeder cooperation, and the project's participants are examining other cooperative arrangements among this group.

Advanced Materials and Standards (U.S.-U.K. co-lead) - This project, under leadership of the National Bureau of Standards (NBS), promoted multilateral collaboration in advanced engineering materials to develop measurement

standards and codes of practice for these materials. By harmonizing the regulatory systems for advanced technologies, the interest of free, competitive trade will be advanced. Four technical working groups have been launched in the areas of Wear Test Methods, Surface Chemical Analyses, Ceramics, and Polymer Alloys or Blends.

The U.S. also participates in six other projects, but does not serve as the lead or co-lead country. The status of activities on these projects is summarized below.

Advanced Robotics (France-Japan co-lead) - The goal of this project, coordinated by the National Science Foundation (NSF), is to contribute to the development of advanced robot systems capable of operating in unstructured environments by exchanging data on R&D activities, conducting joint workshops, and undertaking joint evaluation of international research programs. Two workshops were held in 1984 to explore technical problems and opportunities for research. A workshop in Japan reviewed the Japanese large scale project on mobile robots in hazardous areas and a second workshop in Italy focused on robots in construction and civil engineering.

Biological Sciences (European Communities lead) - The goals of this project, coordinated by NSF, are to promote international cooperation in fundamental research in biology by sharing data bases, instrumentation, and collaborating on trans-boundary problems such as pollutant transport, biological diversity, and the consequences of deliberate release of genetically engineered organisms. The project participants have identified two research areas for future collaboration, the neurosciences, brain and behavior research, including research on neurological and mental disease, and ecosystems research, with emphasis on genetic diversity.

Impact of New Technologies on Mature Industries (France-Italy co-lead) - This group held two meetings in 1984. Since the co-lead countries have selected traditional textile and handicraft metalworking industries as a sub-theme for cooperation, this activitiy is limited to information exchange. If the area scope of this activity is expanded to encompass industries more relevant to U.S. conditions, the U.S., under NSF coordination, may become more involved in this activity.

Public Acceptance of New Technologies (U.K. lead) - To date, this project has been concerned with examining

information technology and organization, new communications technology and the consumer, and national assessment of attitudes of new technologies. Specific research programs have been funded by the U.K. NSF coordinates U.S. involvement in this activity, which continues to be minimal.

Photosynthesis (Japan lead) - The U.S., under DOE coordination, has not been actively involved in this multilateral project because a significant amount of international cooperation in photosynthesis is already underway between the U.S. and Summit partners, particularly Japan, through existing bilateral mechanisms. The Japanese hosted a meeting in Tokyo this November to discuss potential collaboration under the Working Group framework.

Aquaculture (Canada lead) - The U.S. coordinator for this activity is the Department of Agriculture (DOA). During 1984, country-by-country aquaculture profiles have been exchanged and will be published. The Planning Group met in April to design two future workshops in the areas of salmon smoltification and shellfish production. The Planning Group also established eight study groups on Water Quality, Aquatic Animal Health, Reproduction and Stock Improvement, Husbandry, Nutritions and Feed Technology, Optimization of Biological Productive Systems, Economic Dimensions, and Legal Frameworks.

The U.S. is not participating in the other six projects sponsored under the Summit Working Groups. They are photovoltaic solar energy, food technology, high speed trains, housing and urban planning in developing countries, bio-technology, and new technologies applied to culture, education, and vocational training.

Organization for Economic Cooperation and Development(OECD)

In cooperation with the Industry Committee and in consultation with the Trade Committee, the OECD's Committee on Science and Technology Policy(CSTP) continued, as a major priority, work on studying obstacles to trade in high technology products. A progress report on this effort was prepared for the OECD Ministerial meeting in May. Reports on trade in several categories of high technology products (machine tools, semiconductors, pharmaceuticals and space products) have been prepared and are expected to be published in early 1985. This effort, the result of a U.S. initiative at the 1982 OECD Ministerial, involved considerable participation by several U.S. agencies.

The Committee also continued its work on various aspects of biotechnology, with working groups on safety and regulation of biotechnology holding several meetings throughout the year. Work on patent protection for biotechnological innovations led to a study of comparative practice in this area. This study which will be published in 1985, endorses U.S. practice in applying patent law to biotechnolgy and recommends other nations to consider adopting similar methods.

The work of OECD's Science and Technology Indicators Unit (STIU), which compiles comparative statistics on national R & D budgets, scientific personnel resources and other S & T indicators of value to science policy officials, was the subject of a review by user representatives. The results will permit the unit to better allocate resources to serve user needs.

A review of recent developments in science policy in member states was prepared and will be published in 1985. The Committee also continued its reviews of national science policies of individual countries at their request. Reviews of Australia and Finland are in progress. Publications on earlier reviews of Greece and Norway are being prepared. This activity has proved valuable to countries seeking to restructure their national scientific establishments. Studies have also begun on the evaluation of research output and policies regarding research instrumentation.

Other efforts by the Committee in 1984 have included: completing a study of Science, Technology and Competitiveness, completing a multi-year study of East-West Technology Transfer, reviewing developments in International Cooperation in Science and Technology, holding a conference on Science, Technology and Regional Development; and publishing a study on Industry-University cooperation. Studies of the International Flow of Technologies, Innovation Measures and the Economic Climate continue; a comparative study of tax codes and their impact on research and development and innovation has been completed, and work has begun on examining financial assistance measures to encourage industrial innovation. Work on assessing the Societal Impacts of Technology has begun with the focus on the effects of technical change on employment.

NATO Science Committee

U.S. participation in the work of the NATO Science Committee during 1984 was highlighted by holding the Committee's spring meeting in Washington for the first time in 15 years. This meeting was addressed by the President's

Science Advisor, Dr. George Keyworth, Undersecretary of Defense for Research and Engineering, Richard DeLauer, and Assistant Secretary of State for Oceans, International Environmental and Scientific Affairs, James Malone. The Committee met for a half day at the National Science Foundation for a briefing by senior officials on the Foundation's activities. There were also meetings with the House Committee on Science and Technology and with senior officials of the National Academy of Science and the American Association for the Advancement of Science. Following the formal meeting, Committee members also visited the Bell, Exxon and Cold Spring Harbor laboratories.

The Committee continued its programs to facilitate cooperation and exchange of information between scientists in NATO countries and to stimulate research in new areas of science. These programs, highly respected by the scientific community, are financed by a $16M budget. They include Advanced Study Institutes, highly focused tutorials to teach state of the art subjects not yet taught in universities; Advanced Research Workshops, meetings of senior researchers to review the state of the art in given fields and make recommendations for future research; collaborative research grants to cover the transport and communication costs of projects carried out by teams in two or more countries, and special program panels to stimulate newly emerging areas of science. The Research Fellowship program, administered by the National Science Foundation, is the largest individual source of international post-doctoral fellowships in the hard sciences available to U.S. researchers. It supported the research of 43 U.S. scientists in foreign laboratories.

American scientists and institutions continue to derive significant benefits from the Committee's programs, with over 50,000 U.S. scientists having participated during the years the programs have existed. Many foreign recipients of fellowships choose to continue their research in U.S. universities, giving the U.S. the benefit of their experience.

The Committee's "Double Jump" program, aimed at promoting exchange of researchers between industry, universities and government laboratories in different countries, continued to function effectively. The National Science Foundation is considering additional support to increase the number of U.S. scientists and engineers participating in such exchanges.

The Science for Stability program which helps Greece, Portugal and Turkey improve their scientific and technical infrastructure continued to operate specific research projects involving universities, industries and government institutions.

U.N. Educational, Scientific and Cultural Organization (UNESCO)

On December 19, 1984 the Assistant Secretary of State for International Organization Affairs, Gregory J. Newell, announced the departure of the U.S. from UNESCO with the following statement:

"One year ago, the United States notified UNESCO (the United Nations Educational, Scientific and Cultural Organization) that U.S. membership would terminate on December 31, 1984. We have confirmed today that U.S. withdrawal from UNESCO will take effect on that date."

"UNESCO policies have, for several years, departed sharply from the established goals of the Organization. We have regularly advised UNESCO of the limits of U.S. (and Western) toleration of misguided policies and programs, and of repeated management failures. The circumstances that impelled us, last year, to announce our plan to withdraw have not changed sufficiently, this year, to warrant a change in our decision. Extraneous politicization continues, as does, regrettably, an endemic hostility toward the institutions of a free society - particularly those that protect a free press, free markets, and, above all, individual human rights. UNESCO's mismanagement also continues, and approximately 80% of its $374 million biennial budget is still spent at its Paris headquarters, leaving only 20% to be spent elsewhere."

"UNESCO has made efforts to reform itself during the past year. Taking the pattern of UNESCO's own past performance as the point of reference, we can agree that those efforts appear genuine. Viewed, however, in light of the serious concerns we expressed last December, an unacceptable gap clearly remains. An independent Monitoring Panel of eminent American experts formally reported a similar conclusion to the Secretary of State on November 27, 1984. The Panel noted that there was considerable discussion, and some incremental movement in the direction of the fundamental concerns of the U.S., but that there was no concrete change."

"The United States remains committed to genuine and effective international cooperation that serves the legitimate needs of developing nations. We intend to continue support for international activities in the fields of education, science, culture and communication through other existing channels: multilateral, regional, bilateral and private sector institutions."

"Nevertheless, we remain committed to the belief that genuine reform of UNESCO is a desired goal. We are interested in such a renovation. We appreciate the labors of all those - countries and individuals alike - who have worked to return UNESCO to its origional purposes. We intend, during the coming year, to labor still with those supporters of UNESCO."

"As the President stated in his recent address to the UN, we support genuine and effective multilateral cooperation. To help return UNESCO to that purpose, we have in mind a three-pronged approach:

- To promote UNESCO's reform - from the outside - the U.S. will designate a Reform Observation Panel of independent experts. It will be charged to assess and report on events within UNESCO, and to advance our continuing interest in reform.

- We will work with all those - countries, individuals and private organizations - who seek improvement in UNESCO.

- We will establish an observer mission in Paris to protect American interests at UNESCO and work with like-minded member states on reform measures, particularly between now and the end of UNESCO's 23rd General Conference in 1985."

"When UNESCO returns to its original purposes and principles, the United States would be in a position to return to UNESCO."

With the important exceptions of the Intergovernmental Oceanographic Commission (IOC) and the International Geological Correlation Program (IGCP), the United States will cease participation in the governance of UNESCO science programs. However, the United States remains fully committed to international science cooperation and is presently examining possible alternatives outside UNESCO for enhancing such cooperation.

Multilateral Science and Technology for Development

During FY 84, the Intergovermental Committee for Science and Technology for Development held one session in New York, but again failed to reach agreement on a financing system.

CHAPTER 4 - BILATERAL S&T PROGRAMS

More than twenty federal agencies carry out cooperative scientific and technological activities with well over thirty countries. These activities are carried out through government-to-government "umbrella" agreements, memoranda of understanding between counterpart agencies and laboratories, and project agreements. The function of the Department of State regarding these activities is to coordinate them in terms of assuring that they are consistent with U.S. foreign policy objectives with respect to each country.

The list of countries with which the U.S. Government cooperates in S&T has been dealt with extensively in Science, Technology and American Diplomacy, 1982. This chapter deals only with selected countries which have formal bilateral programs with the United States and where there have been significant developments in 1984. Readers should note that further information on cooperative S&T activities carried out by U.S. technical agencies with the countries reviewed in this chapter or in other countries is also to be found in other chapters on specialized S&T programs in this Report or in separate annual reports prepared by the technical agencies. For the assistance of readers a Country Index is being provided as a new feature of this Report.

During 1984 a number of significant events took place in U.S. bilateral S&T programs: the U.S./People's Republic of China Agreement was extended for another 5 years; the U.S./Japan non-energy S&T program was extended and new S&T agreements were signed with Brazil and Sri Lanka; the President signed into law appropriating funds necessary to generate earnings for a U.S./India binational fund. Plans are also in place to review the intergovernmental S&T agreement with Poland.

Once again, U.S. activities with the People's Republic of China far exceeded all other bilateral S&T activities. In addition to maintaining programs in 23 active protocols, an additional 5 accords are under negotiation. The program with Spain is increasing, with an expanded number of research proposals submitted by colleges and universities in both the U.S. and Spain for joint funding.

Developments during 1984 in some of the bilateral S&T programs for which the State Department exercises coordination are described below.

China

The first five years of the U.S.-P.R.C. Bilateral Cooperation Agreement in Science and Technology have passed,

and we are able to note with pleasure the extension in January, 1984, of the Agreement for another five years. Within the past five years, U.S.-Chinese bilateral cooperation has grown from 9 protocols in 1979 to a total of 23 protocols as of December, 1984. Three protocols were signed in 1984 by the Department of Commerce in the areas of Scientific and Technical Information, Management of Industrial Science and Technology at Dalian, and Statistics (Census Bureau). Additional accords in the areas of fossil energy (DOE), telecommunications, mapping, charting and geodesy, space cooperation, and health are presently under negotiation. All protocols up for renewal in 1984, a total of five (5), have been renewed based on the progress accomplished during the first five years. Participating in the U.S.-Chinese cooperation are more than two dozen federal agencies as well as the National Academy of Sciences.

This bilateral S&T agreement is the largest maintained by each government, a reflection that both sides consider this program of mutual benefit and important to furthering relations between the two countries. Such cooperation plays a very important role in bringing new technologies and methodologies to China and in developing capabilities in basic science research, including areas such as health and information management. The following are highlights of activities during FY 1984.

One of the big success stories in the China Program relates to the Dalian Center for Industrial Science and Technology Management Development (DOC). This center was jointly established in 1980. Through its various management courses, the Center trained approximately 1000 participants, including directors or managers of industrial enterprises, senior and middle level managerial personnel from economic and scientific and technological departments, and instructors of management courses from academic institutions. This program has been so successful that a new protocol was signed in April 1984 extending this cooperative activity for five more years, expanding its scope, and establishing an MBA program in conjunction with SUNY/Buffalo.

In the area of High Energy Physics (DOE), excellent progress has been made in the planning and design of the Beijing Electron Positron Collider (BEPC). BEPC was officially designated as a key project by the government of China in 1983, thereby moving its completion date to 1987 rather than the projected 1988. This Protocol was extended for another five years in early 1984. In the area of Atmospheric Science and Technology (NOAA), four major cooperative research programs adopted midway through the five year period showed increased project activity in 1984. For example, implementation was

begun in two of the five projects under the Program of Comparison Studies of Climate and Agriculture of the North China Plain and the North American Great Plains. In Medicine and Public Health (HHS), cooperative activities have proceeded vigorously. Collaborative epidemiological studies are under way in the area of cardiovascular disease, a major disease of both countries, and trials are being conducted of a hepatitis vaccine. Collaborative research on treatment for schizophrenia has also been conducted. In the area of Earthquake Studies (USGS), substantial progress has been made in establishing a China Digital Seismic Network in cooperation with China's primary earthquake prediction program in Western Yunnan. This program has been able to characterize active faults in China and the U.S. and to estimate ground failure potential and seismic response of engineered structures.

Plans are underway for the Fourth Joint Commission Meeting to be held in Washington in the spring of 1985. It is expected that several Protocols will be signed at this meeting and that several new annexes to existing Protocols will also be initiated.

Korea

The U.S. science and technology relationship with the Republic of Korea (ROK) was not singled out for discussion in the 1984 Title V report. This year, our activities with the Republic of Korea increased notably and signal an expansion in the level and frequency of scientific and technological contacts between the two countries.

Principal Deputy Assistant Secretary Harry R. Marshall, Jr. of the OES Bureau, Department of State, chaired the U.S. delegation to the S&T Sub-Group under the U.S.-ROK Economic Dialogue, held in Seoul, February 1984. The Korean side presented a number of new proposals for enhanced cooperation with U.S. Government agencies. The ROKG also indicated that they wished to upgrade the S&T relationship. The two sides agreed that a high level meeting could be held to explore this and other issues of concern.

The Under Secretary of State for Security Assistance, Science and Technology, William Schneider, chaired the U.S. delegation to the high level meeting in Seoul November 11-12. In addition to a discussion of project proposals presented in February, the two sides reviewed:

--the ROK proposal for a binational science and technology foundation modeled after the U.S.-Israeli Binational Industrial Research and Development Foundation;

--the U.S. suggestion that better intellectual property and copyright protection is essential for more U.S. private investment and joint ventures in the Korean private sector; and

--the ROK position that ministerial meetings be held annually.

The two sides concluded that we would stay in close contact, and the ROK took note of U.S. concerns on intellectual property and copyright protection. Agreement was reached that future high level meetings would be called as needed, and that regular consultations would continue through the Sub-Group on Science and Technology and the Joint Committee on Nuclear and Other Energy Technologies. The Sub-Group on Science and Technology has scheduled its next meeting for Washington in the spring of 1985.

Japan

U.S. economic focus is increasingly directed at East Asia and the Pacific. In an address to the Honolulu Council on Foreign Relations July 18, Secretary Shultz noted that "While our trade with the rest of the world last year grew by only one-half percent, trade with the Asian and Pacific region grew 8%, reaching $135 billion." A major portion of that figure is U.S. trade with Japan, our second largest trading partner after Canada. Japan's economic success has relied in large measure on the successful development and application of technology. Given this, it is clear that our science and technology relationship with Japan must keep pace with that country's rapidly expanding scientific and technological base.

During 1984, we continued to review the U.S. science and technology relationship with Japan. Both within and outside of the U.S. Government, those concerned with the healthy development of U.S. science and technology contacts with Japan took a hard look at the future of this relationship.

The United States-Japan Advisory Commission submitted a report to the President of the United States and the Prime Minister of Japan entitled "Challenges and Opportunities in United States-Japan Relations." The science and technology section of that report offers a number of recommendations. In particular, it suggested to both leaders that ". . .the time has come for a high-level review to determine possible improvements and new directions for mutually beneficial cooperation."

In April 1984, the Under Secretary of State for Security Assistance, Science and Technology launched a U.S. Goverment-wide review of U.S.-Japan science and technology relations, building on the assessment of existing activities as reported in the 1984 Title V report. We have completed the initial phase of that review and anticipate that the second phase --which will focus on future directions-- may take as long as a year.

In addition to the wealth of ongoing activities between U.S. and Japanese technical agencies in 1984, several events are worth noting. EPA Administrator William Ruckleshaus visited Japan last February to meet with his counterpart on the bilateral Environmenal Agreement. We were encouraged with the potential for expanding work under this Agreement, particularly in areas that have been dormant for some time. Also, in this context, we note that the Department of Energy and the National Science Foundation fully implemented a new program of cooperation on photosynthesis and photoconversion after two years of extended negotiations.

The U.S. proposal for Japanese participation in our space station has been a subject of continuing discussion with Japan pursuant to the President's announcement during his State of the Union address last January. While the Japanese have not come to a formal governmental decision, we are encouraged by our consultations to date. (See also Chapter 6, section on "Space Station".)

Thailand

The maintenance of Thailand's independence, territorial integrity and stability is a major U.S. foreign policy goal, embodied in our commitment to Thai security dating back 30 years. Thailand has developed a high degree of stability based on such revered symbolic institutions as the monarchy, Buddhism, a permanent civil service, and the increasing interest of the public in democratic government.

Another major factor in Thailand's continued stability is its strong economic development. Cooperative science and technology programs contribute to U.S. objectives of assisting Thailand's economic development through expanding its industrial capability, agricultural achievement, and human services. At present, several U.S. technical agencies conduct a modest level of mutually beneficial bilateral cooperation with Thai counterparts. Some examples include current work at a LANDSAT ground station, agricultural research to find crops which could substitute for opium poppies grown in north Thailand, and a project involving climate and weather models directed toward improved rice crop forecasting.

The visit of Presidential Science Advisor George A. Keyworth to Bangkok in September 1983 underscored U.S. interest in encouraging Thailand's scientific and technological development. To provide more tangible evidence of our desire to enhance cooperation in the science area, we concluded an umbrella science and technology agreement with Thailand, which was signed by the Secretary of State and the Thai Foreign Minister on April 13, 1984 at the White House on the occasion of Prime Minister Prem's U.S. visit.

For at least the next several years, development assistance programs will probably represent the major component of U.S./Thai science and technology cooperation. AID has just assigned a respected businessman/scientist as Science Advisor to its mission in Bangkok, with the mandate to plan a comprehensive science and technology program to extend over the next few years.

Thai scientists are largely U.S. trained. They have had long experience in dealing with U.S. universities and research institutes, as well as full familiarity with U.S. methods, equipment, and technical products. Our science and technology programs seek to strengthen these ties. There are individual cases in which Thai-based research could be of benefit to U.S. science. Moreover, commercial interests will be expanded through closer relationships between the U.S. private sector and Thai counterparts both public and private.

Indonesia

Indonesia, the world's fifth most populous country, extends several thousand miles across sea lanes which are vital to the performance of the U.S. security mission in the Pacific and Indian Oceans. A moderate, constructive participant in a variety of international organizations, Indonesia is a founding member of ASEAN, support for which is the keystone of our Southeast Asia policy. Activities which promote Indonesia's economic and industrial development are vital to its continued political stability, and thus are important U.S. policy objectives.

President Soeharto's "New Order" Government, established in 1965 after an abortive communist coup, has inaugurated an era of pragmatic policies and economic development. Relying heavily on Western and Japanese assistance and investment, Indonesia maintained an 8% annual economic growth rate during the 1970's. Oil exports have gained in value and importance to the Indonesian economy, now accounting for about 60% of total government revenues. Agriculture has been growing at an impressive rate, lessening dependence on rice imports.

Indonesia is now facing a difficult adjustment period as it attempts to wean the economy from oil dependence while fostering an employment-creating industrial sector.

The U.S.-Indonesian science and technology agreement, which came into effect in 1979, provides a good framework for cooperation. Diplomatic notes renewing and amending the agreement were signed at a White House ceremony in July 1984. Discussions continue in Jakarta to identify possible new science and technology initiatives appropriate to Indonesian needs and a realistic estimate of available U.S. resources.

Although several modest programs sponsored by U.S. technical agencies are presently active, the main thrust of our science and technology effort in Indonesia is provided by AID. A full time U.S. science advisor, paid by AID, works on the staff of Indonesia's dynamic Research and Technology Minister, B.J. Habibie. AID currently finances S&T-related project activities in agriculture research, soil and water conservation, energy and health research. In addition, design is underway of an aquaculture project to provide assistance in coastal zone development, technical cooperation and collaborative research, and support to marine-related universities. One million dollars has been set aside in general participant training funds specifically for S&T.

The Indonesian Government has proposed cooperation in four main areas: 1) creation of a "technology processing" laboratory to adapt foreign technology to Indonesian industrial needs; 2) establishment of an electronics laboratory; 3) increased training of Indonesians in U.S. research institutions and industrial plants, and 4) increased funding for projects of the National Academy of Sciences.

Given its great size and considerable economic potential Indonesia represents a vast market for commercial exchange in which technology transfer will play an important role. Many Indonesian scientists and others have benefitted from U.S. education and technical training. They are familiar with U.S. goods and services. Our science and technology programs are designed to reinforce and extend ties to the mutual benefit of both countries.

Western Europe and Canada

Science and technology cooperation between the U.S. and technologically advanced countries of Europe and Canada continued to function well in FY 1984, generally without the need for government to government agreements.

In December 1984 the biannual policy level review of bilateral S&T activities with France was held to review existing bilateral cooperation and opportunities for increased bilateral and wider European cooperation. The meeting also reinforced efforts to integrate better the engineering and business communities of France and the U.S. into a largely self-sustaining process of cooperative scientific research. The U.S. delegation to the meeting was headed by the President's Science Advisor, Dr. George Keyworth.

During 1984, on-going bilateral agency-to-agency programs with these industrialized countries continued working well. Also, some significant new agency-level agreements were concluded, such as the new bilateral interagency agreement between the National Science Foundation (NSF) and its Austrian counterpart. However, the pursuit of bilateral S&T cooperation with the industrialized world is not dependent on formal agreements. As noted by NSF, "Our scientists most frequently turn for partners to" these countries and Japan because "their capabilities are generally closer to our own." Canada is an example of the self-sustaining nature of this cooperation even in the absence of formal agreements at the agency level. Traditionally the largest recipient of National Institute of Health (NIH) awards, Canada has no formal agreement with NIH. Nevertheless, as the bilateral review with France suggested, emerging European-wide cooperation in high energy physics, space and other "big ticket" research, and the efficiency of joint research on such issues may presage the need for increased formal government to government S&T reviews between the U.S. and these countries individually and/or in groups.

Spain

Spain and the United States have a special relationship, now augmented in the political sphere by Spain's accession to NATO in May 1982. The U.S.-Spain Treaty of 1976 and the successor agreement of 1983, which provides the U.S. Navy and Air Force access to Spanish military facilities, solidified this relationship.

An integral and important part of both the 1976 and 1983 agreements was a science and technology annex. The annex to the 1983 agreement emphasizes the importance of scientific and technological cooperation between the two countries and provides funding for cooperative scientific research in areas relevant to the economic modernization and social well-being of the peoples of the United States and Spain. In effect, the science annex makes concrete the interdependence of science, technology and foreign policy.

The funds authorized for science cooperation amounted to $7 million in FY 1984. In 1984 the U.S.-Spain Joint Committee on Science and Technology approved awards for cooperative projects in various fields including natural resources, agriculture, oceanography, energy, health, basic science and other areas.

A principal criterion for each project is that it include benefits for both countries. Among the major agency projects approved in January 1984 was one involving the effects of heavy rain on aircraft safety, an area of major interest to NASA, the U.S. Air Force, the American aircraft industry and their Spanish counterparts. Others involve such diverse disciplines as earthquake evaluation, prevention of plant diseases, water resource management, and causes of birth defects.

The increasingly democratic spirit in Spain has produced a vigorous and challenging intellectual climate in which the scientific disciplines have had a major role. To complement this, both the U.S. and Spain devoted special attention to assuring that U.S. and Spanish academic institutions were fully integrated into the program administered by the Joint Committee. Universities from 13 U.S. states were among the successful awardees at a special June 1984 session of the Joint Committee. Again, the projects showed considerable diversity. Areas of joint endeavor include innovative pest management, increasing yields in cotton, solar energy conversion, neurological disorders, and reducing environmental pollution.

As the year ended, there was even greater competition for the planned 1985 science and technology awards, assuring high standards of scientific excellence for successful proposals. More significantly each successive round of awards strengthens the growing intellectual links between Spain and the United States which in turn solidifies the political and economic relationship.

U.S.S.R.

As reported in the 1984 Title V Report, the level of cooperative science and technology activities under the eight active agreements with the Soviet Union declined to roughly 20 percent of the 1979 level when all eleven agreements were in force. This reflected the change in the political situation following Soviet invasion of Afghanistan in 1979 and Martial Law Declaration in Poland in 1981. Three agreements -- science and technology, space, and energy -- were allowed to lapse in 1982 and, after the Soviets shot down the Korean airliner on September 1, 1983, discussions to extend the transportation agreement were ended, effectively terminating on its expiration date, June 19, 1983.

However, during that time and since, the U.S. has continued activities of particular benefit to itself in the areas of health, environmental protection and safety. Moreover, the structure of scientific cooperation was maintained intact in most areas so that beneficial exchanges could be expanded if the political situation warranted. In this connection, the U.S. extended the specialized agreements in oceanography, medicine and public health, artificial heart research and development, environmental protection, atomic energy, and housing. In 1984, the National Bureau of Standards renewed its agreement with its Soviet counterpart. In addition, the U.S. and Soviet co-chairmen of the Joint Committee under the U.S.-Soviet Environmental Agreement met to re-establish high level contacts. This was capped by the President's declaration in June 1984 noting and supporting U.S. initiatives to expand bilateral S&T relations with the Soviets. This prompted the announcement in December of the resumption of cooperative S&T activities under the Bilateral Agricultural Agreement. The U.S.-Soviet Oceans Agreement, mentioned by the President for possible renewal, is also being reviewed by the relevant U.S. agencies for earliest possible resumption.

To minimize technology transfer inimical to U.S. interests, an inter-agency group of the intelligence community routinely assesses the risk of transfer to the Soviet Union of any militarily significant technology through joint research, exchanges, and other activities conducted under the several agreements. Since the activities proposed and conducted generally involve basic research or scientific applications in the fields of health, safety, or environmental protection, they rarely carry the risk of transfer of militarily significant technology. In those few instances where such a risk is identified, the activities are either cancelled or appropriately restructured to minimize any potential loss.

Eastern Europe

With the Polish regime's enactment of amnesty in August, 1984 (releasing most political prisoners), the U.S. Government lifted sanctions on S&T cooperation with Poland. U.S. technical agencies have been requested to resume interrupted joint activities with Polish scientists. Towards that end, Department of Agriculture officials visited their counterparts in Poland, including the Minister of Agriculture, to discuss ongoing activities and future joint research programs of mutual interest. In December, National Science Foundation officials met with the Polish Academy of Sciences to discuss implementing an interagency Memorandum of Understanding, signed in December 1981, but not implemented due to martial law in Poland. As a next step, new agreements are scheduled for early negotiation to replace the S&T agreements which expired since 1981.

Moreover, the relevant agencies are scheduling funding for new cooperative activities. In this connection, Congress has indicated a willingness to provide funding once a new agreement has been concluded and program activity is ready to resume. Also, we expect to post a Science Counselor to Warsaw in early 1985. In sum, a renewed effort is underway to re-establish contacts with the scientific communities of Poland and to increase cooperative scientific activities.

Negotiations were conducted to renew the U.S.-Bulgarian Exchanges agreement due to expire at the end of 1984. The agreement was renewed in December, thus preserving the framework for cooperative S&T activities.

A mid-term bilateral review of the U.S.-Hungarian Exchanges Agreement has been arranged for early 1985. A review of activities in 1984 by U.S. technical agencies indicated their high satisfaction with results from cooperative basic research in the natural and life sciences.*

Scientific cooperative activities with Romania are also being supported under the Intergovernmental Exchanges Agreement.

Yugoslavia

Science and technology cooperation between the United States and Yugoslavia dates from the mid-1950's. The program provides for the exchange of scientists and scientific delegations in such fields as earthquake geology and prediction, occupational health, epidemiology and metallurgy.

The program yields research of benefit to both sides, and the U.S. gains indirectly from the prestige which Yugoslav scientists are accorded by their peers for working with U.S. institutions. Research scholars are often influencial figures in Yugoslavia's social and economic structure, filling advisory positions of economic and political importance.

This program is financed through a State Department appropriation, with matching funds contributed by Yugoslavia. In FY 1984, each side contributed 1,683,000 in dollars or dinars to the joint fund.

The existing S&T agreement runs until June 1985, and discussions are underway about the text of a successor agreement.

*For more on U.S.-Hungary cooperation, see also Chapter 12, section on "Hungary".

Mexico

Because we are neighbors with a long common border, the United States and Mexico share many interests and problems. Varied efforts in the area of joint science and technology have proved useful in providing avenues for possible amelioration or resolution of shared problems, such as common environmental concerns.

The U.S.-Mexico Mixed S&T Commission met in Washington in December 1983 and, among other things, agreed to streamline the administration of the Commission's work. The Commission's coordinating committee reviewed the status of many joint proposals tabled during the meeting along with the implementation of other decisions. As a result of preparatory work, the coordinating committee met in October 1984 to carry out its mandate. Perhaps the most important change was that new projects jointly proposed by the U.S. and Mexico operating agencies can now be approved by the administering agencies. The new decision-making machinery has yet to be proved in practice.

The two countries have ongoing agreements or programs in many areas, including agriculture, forestry, scientific research, health and social services, urban development, the environment, geological and space cooperation. The U.S. cooperating agencies are generally satisfied with the progress of their joint programs.

Brazil

A new S&T umbrella agreement with Brazil was signed by the Secretary of State in February 1984.

When ratified by Brazil, the new agreement promises to widen the scope of ongoing bilateral programs already underway in areas of agriculture, health, oceanography, space, meteorology, natural resources, basic sciences, environment, engineering, and industrial technology. In addition to the more traditional cooperative formats such as the exchange of technical and scientific information, the exchange of scientists and joint activities in research and development, the new agreement will provide a framework for renewed direct contacts and cooperative activities between private enterprises of both countries. It will also permit the participation of third countries and international organizations in programs that fall within its aegis.

While awaiting ratification by the Brazilian Parliament, the U.S. agencies are functioning under the old agreement. Many parts of the ongoing U.S.-Brazil S&T joint programs continued to show vitality during FY-84 -- for example, the program with NSF. Some renewed interests, e.g. environmental cooperation, have developed as well.

Brazil remains ambivalent in its technology policy by trying to avoid a dependence on outside sources of technology. Indeed, Brazilian technicians have achieved world leadership in some areas (for example, in bio-mass research and its application to gasahol-using autos). At the same time, Brazil wants to participate in a science and technology dialogue with the rest of the world.

Many Brazilian scientists are American-trained and our scientific and engineering communities share many common attitudes, interests, and scientific concerns. Historically they have worked well together.

Israel

Earlier Title V reports outlined the excellent cooperative S&T programs promoted over the past decade by the U.S.-Israeli binational foundations.

The FY 1985 Continuing Resolution stipulated that a portion of the Economic Support Funds for Israel be used to replenish the funds of the four binational foundations. Accordingly, $65 million will be made available from FY 1985 funds with matching Israeli Government funds also to be provided. The Binational Industrial Research and Development Foundation (BIRD), the Binational Science Foundation (BSF), and the Binational Agricultural Research and Development Fund (BARD) will each receive $20 million; the U.S. - Israel Educational Foundation (USIEF) will receive $5 million.

The foundations have been very instrumental in supplementing and facilitating unofficial contacts between the United States and one of its closest allies. Furthermore, research completed by the foundations serves to stimulate science and technology activities by both the United States and Israeli private sectors and mutually benefits both countries.

BSF

During FY 1984, the BSF, BIRD and BARD achieved a number of impressive accomplishments. The 166 BSF funded projects, of which 45 were new, had a total support, expressed in dollars equivalent, of $3.1 million. They involved the participation of 413 investigators, 201 of which were in the United States.

All major fields of science were represented, including energy conversion, genetic recombination, medicinal and pharmaceutical chemistry, marine geophysics, labor economics, and pollution effects. Recent achievements of some BSF funded projects are:

-- Using computer science, an analysis of data taken from balloons passing over the continent produced a map of the ice elevations of Antarctica. Such maps are needed to understand the glacial dynamics of the region.

-- Through a remote-sensing project aimed at improving wheat farming in dryland areas (e.g. the U.S. Great Plains and Israel), investigators developed an infrared thermal sensing method that quickly assesses responses of field crops to dehydration that could lead to serious injury of crop plants.

-- A highly accurate method of detecting malaria antigens in the blood was developed and adapted to mass diagnosis.

-- Based on a toxic protein found in certain Red Sea fish which repels sharks, one project developed detergent-like substances whose simple molecules work similarly to the fish toxin and may repel sharks in the same way. This knowledge is potentially useful to persons who work in shark-infested waters.

BIRD

In FY 1984, the BIRD initiated 25 projects, a record for its fairly brief history. The total number of projects funded, or in process of being funded, stands at 76 and involve expenditures or obligations around $21 million. Since the BIRD commitments constitute about 50 percent of total project cost, the total R&D activity level represented by these figures is about $42 million.

Of the 25 BIRD starts in FY 1984, 12 are called "Full-Scale projects" (FSP), 10 are "Mini-projects" (MP) and 3 are "Tests of Feasibility (TOF). Of the 76 total projects initiated, 55 are FSPs, 15 are MPs and 6 are TOFs. Although the quantification of the success rate of projects initiated by BIRD can never really reflect current operations given the time lag between project initiation and product sales, the trends are encouraging, both in the number of projects that have begun to go commercial and in total product sales from BIRD projects. Thus, 17 projects have led to at least initial product sales, a 90 percent increase over the corresponding figure reported last year. Total royalties received approximate $ 1 million, about $500,000 received in FY 1984.

Sales from BIRD products, the vast majority deriving from projects started several years ago, now total about $94 million, with $44 million of that figure in 1984 alone. In 1985, BIRD expects sales close to $60 million. Furthermore, BIRD products have been sold not only in the U.S., but also in Canada, South America, Europe, Africa, Australia, and the Middle East.

BARD

BARD, established to address agricultural problems of mutual national concern, supports agricultural research and development consistent with the highest priorities of both Israel and the United Sates through an $80 million endowment fund. The interest earned on this principal provides BARD with income to support cooperative research projects and to administer a grant program. Since its inception, BARD has approved 282 projects, totalling $46.3 million. In FY 1984, BARD funded 38 new projects at $7.2 million. In recent years, BARD has been particularly active in research involving the cultivation of Muskmelons, non-chemical control of soil-borne plant diseases, and mobile irrigation.

Sub-Sahara Africa

U.S. scientific and technological cooperation with Sub-Sahara Africa is limited, for the most part, because of the inherent constraints in small, developing economies. U.S. technical agencies and scientists are hard pressed to locate appropriate technical counterparts in Sub-Sahara Africa with which to establish long-term collaborative relationships. Moreover, where African technical agencies do exist, funding for collaborative efforts with U.S. counterparts is generally not available. Nevertheless, during FY 1984, U.S technical agencies initiated various scientific and technological projects in that region.

The National Science Foundation (NSF) awarded 9 grants, totalling more than one million dollars for research projects in approximately nine Sub-Saharan countries, covering such disciplines as biology, physical sciences and social sciences. It should be noted that this collaborative research includes Francophone as well as Anglophone countries and the region's more developed as well as least developed countries.

Nigeria

As expected, most scientific and technological cooperation with the United States occurs in the wealthier Sub-Saharan countries. Nigeria, with its oil revenues and growing resource

of trained mid-level personnel, ranks as one of the principal countries in the region for such cooperation. In addition to the NSF research grants, the Department of Health and Human Services has a limited number of projects with Nigeria in population and public health, and the Bureau of the Census has a small project jointly funded by the Nigerian government. The Office of Naval Research has also initiated a small reimbursable project to help establish a viable Nigerian hydrographic survey and chart-producing organ within the next five years. While U.S. technical agencies are more likely to find appropriate counterparts in Nigeria for collaborative scientific and technological projects, Nigeria's economic problems have limited the number of opportunities for such efforts. As Nigeria's economic situation improves, we expect that technological and scientific cooperation with the U.S. will also increase.

Over the coming months, the State Department will be working with U.S. technical agencies and their African counterparts to help develop areas for further bilateral and multilateral cooperation in science and technology for this region.

India*

On August 30, 1984, the President signed into law PL 98-411 which, inter alia, appropriates $110 million worth of Indian rupees for investment by the U.S. Department of Treasury to generate earnings for a U.S.-India binational fund. This fund, which will support bilateral cooperation in science and technology, culture, and education, will provide money for projects which, until now, were funded by surplus foreign currency. The Department of Treasury will establish with U.S. banks in India the necessary accounts to ensure that a full year's interest earnings will be available to the fund by the start of FY 1986.

A draft agreement under active negotiation with the Indian Government calls for a binational board of 12 members, six each from the U.S. and India. The Secretary of State has been delegated authority to appoint U.S. members. The board will allocate annual interest earnings of the fund to various U.S. agencies undertaking cooperative science and technology programs in India. It is hoped the board will be constituted in time to have its first meeting early in 1985 so that U.S. agencies applying for allocations will have sufficient time to plan their FY 1986 programs.

*For additional discussion on U.S.-India cooperation, see also Chapter 9, "Bilateral Activities" and Chapter 14, "S&T Initiatives in Country Programs".

The Special Presidential Science and Technology Initiative, which grew out of discussions between the President and Prime Minister Indira Gandhi during her visit to the U.S. in July 1982, is a very important component of the overall U.S.-India bilateral science and technology relationship. This initiative focuses on cooperation in selected fields of mutual interest, with each side contributing on an equal basis. Projects undertaken are to augment, not replace, cooperative activities being carried out under other ongoing programs between the two countries.

The National Science Foundation (NSF), designated as the U.S. Executive Agent for the initiative, has responsibility for coordinating all program activities on a government-wide basis. General policy guidance is provided by the Senior Policy Group chaired by the President's Science Advisor.

Lead U.S. agencies have also been designated for activities in the following sectors: HHS for health; A.I.D for agriculture; NSF for Monsoon research, and A.I.D. for photovoltaics. In addition, a National Academy of Sciences (NAS) panel, reporting to the Senior Policy Group, monitors the progress of cooperative programs and makes recommendations about future activities.

In 1984, NSF assisted agencies in the start-up phase by allocating $2 million of its FY 1984 appropriation among the agencies and providing support to the NAS for its overview panel. In 1985, it is envisaged that each agency will support special initiative activities from its own appropriation and in 1986 these activities will be funded, in part, by the U.S.-India binational fund.

The collaborative scientific and technological activities between India and the United States have continued more or less intact even during periods of political differences and have provided a means of communications and a commonality of interest and experience. This has served the U.S. well given the Indian Prime Minister's direct involvement as Minister of Science and Technology. The new Prime Minister, Rajiv Gandhi, continued to hold that key portfolio and has indicated his strong interest in and support of science and technology.

Pakistan

The U.S.-Pakistan Science and Technology Subcommission held its inaugural session in Islamabad, September 24-25, 1984. The Subcommission dealt with a wide range of issues involving current and projected cooperation between the United States and Pakistan in the fields of science and technology,

but focused particularly on areas of possible cooperation in bio-technology, oceanography, health research and the development of science and technology manpower in Pakistan.

It was agreed that applied research and basic science necessary to develop new genetic varieties of crops, health-related organisms or compounds and industrial catalysts should be examined along with possible areas of cooperation in oceanographic research. Both sides also welcomed the successful negotiation of a new agreement between the U.S. National Bureau of Standards and Pakistan's Ministry of Science and Technology to improve technical infrastructure services in Pakistan and to promote closer cooperation to the benefit of both agencies.

The AID program in Pakistan, which emphasizes agriculture, health/population, and energy, includes many projects with science and technology components. Both sides agreed during the September meeting that science and technology manpower training needs identified by the Pakistani delegation should, where possible, be dovetailed with this program.

At the closing session, expressions of support for the subcommission were read from President Reagan and President Zia. Both sides agreed that the discussions resulted in a better understanding of each other's concerns, views and capabilitites. The delegations also agreed that the Science and Technology Subcommission should meet again in Washington at a date to be determined by the Joint Commission.

Other Cooperative Activities

The U.S National Technical Information Service has been active in Pakistan since 1974, and, for many years, the Smithsonian Institution has encouraged research in Pakistan by senior U.S. scholars in a variety of scientific, technologic, and cultural fields.

The U.S. Geological Survey assisted in the development of the Geological Survey of Pakistan and has had a long history of providing cooperative assistance to this organization. Also, components of the U.S. Public Health Service have cooperated for over twenty years with Pakistan in the health field through a variety of bilateral and multilateral mechanisms.

Sri Lanka

On June 18, 1984, the Secretary of State and the Sri Lankan Finance Minister signed a bilateral science and technology umbrella agreement. This agreement is designed to strengthen

and foster S&T cooperation between the U.S. and Sri Lanka. Discussions are now in progress between the two countries on collaborative projects in oceanography and marine resources research.

Bilateral S&T cooperation with Sri Lanka has thus far been very modest, with most S&T related activities taking place within the context of the U.S. assistance program. For example, A.I.D. expects to begin a major new agricultural research project focusing on subsidiary food crops, and the U.S. National Park Service, working through A.I.D., coordinates with Sri Lankan authorities on the establishment and maintenance of national parks and other land use programs. Also, the Smithsonian Institution has had a long collaborative relationship with Sri Lanka on such projects as wildlife conservation training, elephant ecology, primate ecology, and insect surveys, and the U.S. Public Health Service is examining a proposal to study the effects of radioactive sands in one area of Sri Lanka. No funding decision on this project has yet been made.

PART III - SPECIALIZED S&T PROGRAMS

Chapter 5 - AGRICULTURE IN INTERNATIONAL S&T COOPERATION

This report focuses on major changes and challenges in agricultural scientific exchange during FY 1984. In addition to its own international activities, the Department of Agriculture (USDA) cooperates with the U.S. Agency for International Development (AID), the UN Food and Agriculture Organization (FAO), the World Bank, and other organizations by making agricultural experts available on a reimbursable basis.

The stated goals of agricultural S&T cooperative activity are: (1) improvement of the productivity of U.S. agriculture, (2) conservation of agricultural resources, and (3) maintenance and expansion of U.S. agricultural export markets. Bilateral and trilateral cooperative arrangements are discussed below in terms of these goals. In addition, the report covers a new training program for agricultural scientists and administration from "middle-income" countries and presents a summary of expenditures for USDA international S&T cooperation in FY 1984.

Activities Potentially Furthering Improved Agricultural Productivity

Israel

An important link between the United States and Israel is the U.S.-Israel Binational Agricultural Research and Development (BARD) Fund.*

Trinational (Egypt-Israel-U.S.) Agricultural Program

This program, entitled "Patterns of Agricultural Technology Exchange and Cooperation in Similar Ecosystems: The Case of Egypt and Israel," is funded on the U.S. side by AID. (See also Chapter 14, "Science and Technology for Development".)

Its purpose is to promote agricultural cooperation among Egypt, Israel and the United States and to accelerate agricultural development in Egypt and Israel. It offers possible significant benefits for American agriculture in the field of extension and adaptation of arid and semi-arid farming techniques. Similar benefits are likely to accrue to Egyptian and Israeli research-teaching-extension institutions, in addition to the potential political progress resulting from increased interaction between the two countries.

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*For details on the BARD Fund, see Chap. 4, section on "Israel".

A limited number of innovative technologies that are good candidates for exchange and promotion under the project have been selected in the following areas:

-- Intensification of Farm System Production

   1) Cropping Systems and Water Use
   2) Economic Evaluation of Integrated Cropping and Water Use Systems
   3) Dairy Production

-- Medicinal Uses of Desert Flora
-- Solar Heating of Soils for Disease, Pest, and Weed Control

In addition, a sixth subproject, "Evaluation of Methods for Technology Exchange in Agriculture," will assess the implementation of the five other subprojects and also address broader aspects of agricultural technology exchange, adoption, and diffusion between markedly differing farming systems and societies. Egyptian and Israeli principal investigators and U.S. cooperating scientists will execute these activities according to a unified work plan for each subproject.

The project will be directed by a Coordinating Committee composed of senior scientists and research administrators from each country who have been involved for several years in its development. In the United States, the project is administered through a Participating Agency Service Agreement (PASA) between AID and USDA's Office of International Cooperation and Development (OICD), which is responsible for coordinating, administering, reviewing technically, and evaluating the cooperative research.

Effective October 1, 1984, USDA/OICD research grants were established with the major performing institutions in each of the other participating nations, the Egyptian Ministry of Agriculture and Israel's Hebrew University of Jerusalem. These institutions are responsible for administration of their nation's activities in each subproject. The AID-funded budget for the entire project is distributed in the approximate ratio of 41:41:18 to Egypt, Israel, and the United States respectively.

American, Israeli, and Egyptian scientists designed the project to emphasize involvement of Israeli and Egyptian institutions in accordance with AID guidance. The contributions of American scientists to the subproject activities are expected to be advisory in nature, upon request of the Egyptian and Israeli principal investigators: e.g.,

making consultative visits to subproject sites, providing access to information most readily available in the U.S., and reviewing and evaluating progress reports.

Argentina

Following an extended period of strain with the previous government, the United States has recently increased its overall effort to improve relations with Argentina. Scientific and technical cooperation has been proposed as one of the means to foster improvement. Because Argentina is one of the more technologically advanced countries in Latin America, the potential U.S. benefits from bilateral agricultural cooperation are great. Since climate and soil conditions in some regions of Argentina resemble those in parts of the United States, many of the results of cooperative projects involving high-level agricultural technology are immediately transferable to U.S. circumstances.

In May 1982, USDA and the Argentine Ministry of Agriculture and Livestock signed a Memorandum of Understanding (MOU) calling for expanded scientific and technical cooperation between the two countries in the fields of agriculture, livestock and forestry. Exchanges have been completed under this MOU in foot-and-mouth disease, sweet potato breeding and genetics, smut resistance in sugarcane, agricultural economics, irrigation technology, and subtropical grasses related to the development of livestock grazing methods.

USDA budgeted $8,000 for this activity in FY 1984.

Turkey

A U.S.-Turkish Intergovernmental Agreement on Scientific and Technological Cooperation, signed in February 1983, has paved the way for increased bilateral collaboration in agriculture as well as other fields. Turkey is a long-time U.S. ally whose strategic location between the Soviet Union and the Arab world is particularly important to the United States. The agricultural exchange program will enhance and broaden our bilateral relations by establishing personal contacts and by implementing scientific programs beneficial to both countries.

USDA's exchange program with Turkey will be carried out under the auspices of a bilateral agreement with the Turkish Ministry of Agriculture, Forestry and Rural Affairs. It will enable U.S. scientists to collect unique resources, test research techniques, and accumulate statistical and agroeconomic information. Scientists have already completed a program

focused on glanders, a disease usually fatal to horses and to which humans are susceptible. Among proposed areas for further exchange are: 1) collection of biocontrol agents for leafy spurge, a weed of significant and growing concern in the U.S. Great Plains, 2) research on blue tongue disease, a non-contagious, insect-borne virus disease of livestock, 3) crop production forecasting, price and cost analysis, 4) grading and quality control standards for fruits and vegetables, and 5) poultry vaccine production.

The United States spent $20,000 on scientific and technical exchange with Turkey in FY 1984.

Conservation and Protection of Agriculturual Resources

Mexico

The use of plant materials beneficial for conserving soil and water resources is of interest to both Mexico and the United States, and both countries have exchanged scientific teams on this subject. Mexico is a promising source of potential new materials for use in the United States, while the substantial U.S. capacity for producing conservation seed materials can benefit Mexico when large-scale plantings begin.

Each side spent about $6,000 on this work in FY 1984, and there are strong indications that it will be carried forward, possibly even as the subject of a separate Memorandum of Understanding.

Federal Republic of Germany

USDA has recently developed exchanges with the Federal Republic of Germany related to the effects of acid deposition (acid rain) on forest ecosystems and crops, an important and controversial environmental issue affecting U.S. agriculture. Recent surveys in the FRG indicate that over one third of West German forests are affected by acid deposition causing both environmental and aesthetic problems. Potential economic problems, arising from future shortages of forest products, face the FRG as forest areas decline. In the United States, the effects of acid deposition on forests and crops is becoming a priority research topic. Public pressure is strong for measures to prevent further losses in forest areas, particularly in the Northeast.

In 1984, five American and two German scientists undertook scientific exchange visits to lay the groundwork for a substantive exchange of information, data, research methodologies, and researchers between the two countries related to the symptoms and causes of acid deposition. The goal of these exchanges is to provide sound scientific data for policy makers. The information gained will be shared with the Environmental Protection Agency (EPA) and other U.S. Government agencies.

OICD spent $10,000 on this joint work in 1984 and intends to continue sharing in its support.

Maintenance and Expansion of U.S. Agricultural Export Markets

Algeria

USDA and the Algerian Ministry of Agriculture and Fisheries signed a Memorandum of Understanding on February 2, 1984. This agreement looks toward improving U.S. access to Algeria's agricultural market while providing Algerian agriculture with improved methods of obtaining technical information and advice. It is one of the few official, intergovernmental agreements between the two countries.

During the first year of this bilateral agreement two teams of U.S. scientists visited Algeria to assess potential for collaboration in (1) irrigated desert agriculture including vegetable and date palm production, and (2) high steppe zone resource development including range management and cereals/forage/livestock systems.

Financing programs has been on a cooperative basis, with U.S. sources paying international travel expenses and the Algerians picking up in-country costs in many cases. In 1984, U.S. Government expenses were $9,500, with Algerian expenses about the same.

There is strong support for continued cooperation between the Governments in the field of agriculture, and several projects are scheduled for 1985.

Venezuela

During FY 1984, the Venezuela-United States Agricultural Commission was established as a follow-up mechanism to promote implementation of the market-oriented recommendations of the U.S. Presidential Agricultural Task Force of 1982. The Commission, which met in Venezuela in October 1983 and September 1984, provides a forum to conduct ministerial-level consultations on policy and technical issues of highest

priority for Venezuelan agriculture. U.S. private sector experts and public officials have consulted with their Venezuelan counterparts on means to improve (1) the efficiency of agricultural marketing systems, (2) agricultural economic information and statistics, and (3) the climate for promoting private investment in agriculture.

Because the development of the agricultural sector is a top priority of Venezuela's new Administration, this high-level policy forum has been an effective mechanism for strengthening U.S.-Venezuelan relations. Other USDA programs in Venezuela -- scientific and technical exchanges and the new agricultural scholarship program -- have meshed well with the objectives of the bilateral Agricultural Commission, thus reinforcing its positive impact on Venezuelan-U.S. relations.

The FY 1984 cost to the U.S. Government was $15,000.

Middle-Income Country Training

In FY 1984, Congress added $1.5 million to USDA's budget to develop and implement a training program for middle income countries no longer qualifying for U.S. bilateral aid programs. The initiative was proposed by Senator Cochran to assist agricultural scientists and administrators in obtaining advanced degree training, as well as short-term technical training in U.S. universities. Six countries were selected for the program: Mexico, Colombia, Venezuela, Turkey, Ivory Coast, and Korea. Within six weeks of the program announcement, over 275 nominations were received from government and private organizations. Of these, 105 were selected for U.S. training. Candidates were nominated by their governments, by Foreign Agricultural Service (FAS) "cooperator" groups (e.g., the U.S. Feed Grains Council), and other USDA agencies with interests in these countries. U.S. Agricultural Attaches serve as the focal point for the program in each country.

Summary of Expenditures for USDA S&T Cooperation in FY 1984

Aid-Graduate Scholarship Program Administered by OICD/IT:
$1,500,000

Protocols of Bilateral Cooperation Administered by OICD/STE:
$563,533

Venezuela-United States Agricultural Commission Administered by OICD/STE:
$15,000

Soil Conservation Service (Staff Time):
$50,000

University Linkages Administered by OICD/IRD:
$300,000

Plant Protection and Quarantine:
$1,800,000

Veterinary Science Programs:
$2,700,000

Med Fly Program, Mexico and Guatemala:
$6,000,000

Screw Worm Program, Mexico:
$40,000,000

Agricultural Research Service (Budgeted):
$725,000

Agricultural Research Service (Other Sources):
$1,290,000

CHAPTER 6 - CIVIL SPACE PROGRAM

The U.S. has developed an extensive program of international cooperation in space activities. Over the 26 years since its inception, NASA has entered into over 1000 agreements with some 130 countries and international organizations. These relationships cover a full spectrum of collaborative endeavors, ranging from major space hardware exchanges to the sharing of mission data among scientists around the globe. NOAA also has extensive international participation in its space activities.

The benefits of international space projects are both tangible and intangible. International projects reduce the cost to each country involved and/or permit a more expansive effort than a single country could afford alone. Each partner gains access to the first-class science and technology of other countries relevant to its own programs. International space collaboration also serves broader foreign policy goals aimed at retaining positive, productive relationships with countries benefitting from space activities.

Space Station

In his State of the Union Address on January 25, 1984, President Reagan directed NASA to develop a permanently manned Space Station and invited other countries to participate in the program. By doing so, the President set the course of civil activities in space well into the twenty-first century. The President believes that international cooperation in this program will provide a highly visible and mutually beneficial symbol of free world leadership in space and of the Summit nations' commitment to work together, thus furthering foreign policy goals.

At the London Economic Summit in June 1984, Space Station was one of the six major themes for the U.S. The London Economic Summit meeting was an important step in the ongoing process of developing the international aspects of the Space Station program following the President's decision. The communique issued at the conclusion of the Summit welcomed the U.S. invitation for international participation in its Space Station program, acknowledged the benefits of such a program to technological and economic growth, and noted that the Summit partners would examine the nature of their potential participation in the project. The U.S. has also undertaken to report on the status of international participation in the program at the 1985 Economic Summit to be held in Bonn, Germany.

On August 15, 1984, the President approved a National Space Strategy which, among other matters, directed that the U.S. seek mutually beneficial international participation in civil and commercial space and space-related programs. As a centerpiece of this effort, the U.S. will seek agreements with friends and allies to participate in the development and utilization of the Space Station.

The political dimension of the Space Station program is particularly important because of the unique scope and nature of the program. Viewed as an international cooperative project, then, the Station requires significant financial investments spread over lengthy development and operational periods combined with the need to formulate utilization programs in areas of limited experience.

Prior to the State of the Union Address and the Economic Summit during NASA's Space Station planning phase, substantial international interest in the Space Station surfaced. As a result, NASA established a framework to allow for a productive exchange of information that allowed the incorporation of potential worldwide utilization requirements into its definition of the Space Station.

Beginning the international dialogue by looking at utilization requirements emphasized NASA's convictions that the Space Station is to be a user-oriented facility. Much of the U.S. activity during the planning phase was devoted to understanding U.S. mission requirements. Since the Space Station will be a facility available for use worldwide, the input of our potential international partners has contributed to our understanding of what the international utilization requirements may be.

Approaching the planning process on an international basis expanded the knowledge available for going forward with the definition and development of the Space Station. Of equal importance, it provided the U.S. and its potential partners with an extended opportunity to evaluate cooperative possibilities, to assess their own self-interest in proceeding, and to build confidence in one another's capabilities and good intentions.

Preliminary discussions with representatives from Europe, Canada, and Japan regarding their participation in the space station project have begun. These discussions may be the first step toward agreements dealing with coordination for the system definition and preliminary design phase and, later, for the design, construction and utilization phase.

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These agreements may constitute the most far-reaching science and technology agreements of their kind the United States has entered into with foreign governments and could constitute a framework for close collaboration between the United States and half a dozen other countries in a program involving state of the art technology. These arrangements could also involve a long-term project extending over several decades, and may serve as a model for future complex, multilateral cooperative technology agreements.

The definition phase of the Space Station program will run through 1986. As NASA conducts its definition, so will potential partners be conducting studies to define their elements of the program. We are currently in the process of negotiating international agreements to govern cooperation during the definition phase.

Another aspect of this international effort should not be overlooked. While participation in the development of the Space Station itself may require a level of resources and experience beyond many nations, this need not be the case for utilization. The availability of a permanently manned facility in space opens exciting new prospects for cooperation in the development and use of instruments and various scientific and applications-oriented experiment packages for flight on the Space Station.

Space Shuttle

During FY 84, four Space Shuttle flights took place. Three of them had a significant international aspect. The most significant, the STS-9/Spacelab mission which was launched on November 28, 1983 and landed on December 9, 1983, was included in last year's report.

The next mission, designated 41-B, was launched on February 3, 1984 and returned to Earth eight days later. One of the satellites deployed on this mission was the Palapa B-2, owned by the Republic of Indonesia. Unfortunately, the Palapa B-2 and another communications satellite deployed in this mission failed to reach their intended orbits when their Payload Assist Modules' (PAM) solid rocket motors malfunctioned. During a Shuttle mission in November 1984, both satellites were retrieved and returned to Earth for refurbishment and relaunch.

Also aboard the 41-B was the Shuttle Pallet Satellite (SPAS-01A), the first satellite ever to be refurbished and flown again, making its second voyage into space after having flown on the STS-7 mission in June 1983. The SPAS, built by the German Messerschmitt-Boelkow-Blohm Company, was the first

private European venture to fly on the Shuttle. On this flight it carried eight experiments in materials processing and remote sensing sponsored by the Ministry for Research and Technology (BMFT) of the Federal Republic of Germany and the European Space Agency (ESA).

The fifth flight of the Orbiter Challenger, April 9-13, 1984, and the eleventh flight in the Shuttle program marked a major milestone in the Space Shuttle Program; the first on-orbit retrieval, repair and redeployment of a satellite. This repair of the satellite has permitted scientific observations of the Sun to be resumed, including operation of a British instrument onboard and resumption of the Guest Investigator Program which allows scientists from all over the world to acquire specific solar data for analysis.

Another major achievement of the Shuttle's eleventh mission was the successful deployment of the Long Duration Exposure Facility (LDEF). The LDEF is a reusable passive structure designed to investigate the effects of long-term direct exposure to the space environment on various materials. On its first flight the LDEF carried 57 experiments contributed by more than 200 researchers from eight different countries. These experiments will be left in orbit for nearly a year and analyzed when the LDEF is returned to Earth on mission 51-D in March 1985.

The maiden flight of NASA's third Orbiter Discovery took place in August. As experience with the Orbiter fleet increases, NASA will be able to support more frequent launches for foreign and domestic missions.

Although occuring in early FY 1985, another Shuttle mission is worth noting for its international aspect. This mission, designated 41-G, included the Canadian Payload Specialist, Marc Garneau, in the crew. He conducted 10 Canadian experiments during the mission. The flight of foreign crew members on the Shuttle gives high visibility to scientific and technological cooperation between nations. In the case of Canada, Garneau's flight continues a long history of space cooperation, including the Canadian development of the Remote Manipulator System for the Shuttle.

A French Payload Specialist is scheduled to fly on mission 51-E in February 1985. A key aspect of this flight will be medical experiments to be conducted by the French crewman. The U.S. is also discussing flight opportunities on cooperative missions with Brazil, Italy and Japan. Similar opportunities are available to reimbursable launch customers with major payloads. Germany, Australia and Mexico are among those who are planning for the flight of their own Payload Specialists.

During 1984, NASA entered into three agreements with foreign governments for emergency landing sites for the Space Shuttle. These facilities provide for Contingency Landing Sites (CLS), Trans-Atlantic Abort Landing (TAL), and Trans-Pacific Landing (TPL) sites which are essential for crew safety. Both the TAL and the TPL sites would be available in the unlikely event of premature shutdown of one of the Space Shuttle main engines during the launch phase of a mission from either Kennedy Space Center (TAL) or Vandenberg AFB (TPL); the CLS option would permit recovery of the Orbiter in the event of an emergency while on-orbit. The agreements reached during 1984 include: (1) an exchange of letters with the Government of the Federal Republic of Germany related to Bonn-Cologne Airport; (2) an exchange of notes within the Politico- Military Administrative Affairs Committee between the U.S. and Spanish sides for use of Zaragoza AB, Moron AB, and NAS Rota, and (3) exchange of government-to-government and agency-to-agency understandings with the Government of France relating to use of a French facility in Polynesia. Discussions were also held relating extension of the existing agreement with the Government of Japan.

Eleven Space Shuttle missions are scheduled to take place during FY 1985 including launch of communication satellites for Canada, Mexico, the Arab Communications Satellite Organization (ARABSAT) and Australia. In addition, two Spacelab missions carrying several foreign experiments will be flown.

The Active Magnetospheric Particle Tracer Explorers (AMPTE)

The AMPTE program consists of three satellites working together to increase our understanding of the Earth's magnetic fields. The primary scientific objective is to study the entry of solar wind ions into the magnetosphere and the processes by which particles are energized in the magnetospheric tail.

The three spacecraft in this international venture are the Ion Release Module (IRM) provided by the Federal Republic of Germany, the Charge Composition Explorer (CCE) provided by the U.S., and the United Kingdom Subsatellite (UKS) provided by the United Kingdom. All three spacecraft, which were launched on a single Delta vehicle, August 16, 1984, are required to carry out the AMPTE objectives. Further releases are planned for spring and summer 1985. By pooling resources, each country contributes a single spacecraft to a larger effort and gains the scientific benefits of the combined program.

International Solar Terrestrial Physics Program (ISTP)

As a follow up to a recommendation from the 1982 Versailles Summit Conference calling for closer cooperation in science and technology, progress was made during 1984 on the definition of a new, U.S.-Europe-Japan cooperative program known as the International Solar Terrestrial Physics (ISTP) Program. Research in this field is important for many reasons. Two primary ones are: (1) Many of the observed solar terrestrial processes are important for understanding similar processes within the universe and the solar terrestrial system is the only astrophysical system readily available for in-situ measurements, and (2) to assess the effects of human activity on our terrestrial environment, a full understanding of the solar terrestrial interaction chain must be attained.

The ISTP Program was recommended by the European Space Agency (ESA), Japan's Institute of Space and Astronautical Science (ISAS), and the U.S. National Academy of Sciences at a meeting hosted by NASA in Washington, September 26-27, 1983. The participating agencies have established an ISTP Planning Group, which met in June 1984 in Paris and November 1984 in Tokyo, to assure close coordination of their respective spacecraft and science payload design studies. A central feature of ISTP could be a new system for very rapid, worldwide data dissemination and exchange for balloon soundings rocket probes, scientific satellite data, and shuttle experiments during 1989-1995.

Committee on Earth Observations Satellites (CEOS)

Promoted through discussions of the Economic Summit Panel of Experts on Remote Sensing from Space, international remote sensing satellite operators agreed in Washington, D.C. on September 24, 1984, to coordinate informally their current and planned systems through the organization of a Committee on Earth Observations Satellites (CEOS). Beginning with the 1980 Multilateral Meeting on Remote Sensing, current and potential operators of earth observation systems have met several times to discuss the means by which mutually beneficial cooperation and coordination could be achieved in both the near and longer-term. CEOS replaces the existing groups which had each considered certain aspects of earth observations satellite coordination.

Members of CEOS are Brazil, Canada, France, India, Japan, the United States, and the European Space Agency -- those countries and organizations with operational systems or that have secured government approval to proceed with the design phase of earth observations satellite programs.

CEOS members will exchange technical information on, and pursue the potential for, the multilateral coordination of space and ground segments. They also will investigate the means for increasing data utility and cost effectiveness both for operators and global users. Finally, CEOS members will inform each other of their plans for emerging satellite remote sensing technologies and programs and will discuss appropriate approaches for the coordination of future systems. Special Working Groups on Data and on Intercalibration and Performance Verification have been established, and others may be formed to investigate specific areas of interest. CEOS provides a mechanism for mutually beneficial program coordination. This can result in improved efficiency and better user services. If successful, it should continue along the lines of CGMS (discussed below) as a functional, informal technical forum.

Polar-Orbiting Meteorological Satellites

A number of countries contribute instruments to the NOAA polar orbiting environmental satellites. France provides and operates the ARGOS Data Collection System and the on-board processor for the Search and Rescue system (SARSAT). The United Kingdom provides the Stratospheric Sounding Unit (SSU) and Canada contributes the repeater for Search and Rescue. These instruments are provided on a no-exchange of funds basis.

The U.S. currently funds the development, procurement and operation of polar metsats. Certain costs are incurred to integrate foreign instruments on our spacecraft but these are offset by the savings from not having to fund the instruments themselves.

The ARGOS system budget for 1984-87 is projected to be over 800 million francs, or $86 million. The U.K. has invested in the SSU. The SARSAT system costs were borne by Canada and France.

The international benefits from polar satellite instrument systems are: ARGOS provides position location and environmental data relay from platforms which can be deployed on buoys or in remote locations to provide such data as wind speed, temperature, pressure, rainfall, etc. Data are relayed via satellite to ground facilities where location is determined and the results are relayed to users. The British SSU provides information on stratosphere temperatures. Together with other elements of the TIROS Operational Vertical Sounder (TOVS), vertical temperature profiles are derived and used in global numerical modeling of the atmosphere. The SARSAT system is used to locate downed aircraft and surface vessels in distress through the reception, processing, and relay of signals from emergency beacons onboard planes and ships.

Foreign contributions to NOAA polar orbiting satellites are expected to continue. Discussions are already underway with France and the U.K. for upgraded or advanced versions of ARGOS and the SSU for future NOAA satellites.

In addition, other countries have expressed interest in possible new instrument contributions. This has led to the formation of a new group, called IPOMS, the International Polar-Orbiting Meteorological Satellite group, which met for the first time in November 1984, chaired by NOAA. The group, endorsed by the Economic Summit of Industrialized Nations, will provide a forum for further international cooperation in, and support for, polar-orbiting weather satellites. Members of IPOMS will be agencies in Summit or non-Summit OECD nations currently contributing or intending to contribute to the U.S. civil operational polar-orbiting satellite program, whether in the form of instruments or other support. This could lead to contribution of an international polar metsat in addition to the one U.S. civil polar satellite proposed by the Administration.

Landsat

NOAA operates the Landsat series of satellites that provide sun synchronous views of the earth and its natural resources. Landsat-5, launched March 1, 1984, carries two sensors: the Multispectral Scanner (MSS), an operational instrument providing 80 meter resolution, and the Thematic Mapper (TM), with a resolution of 30 meters (120 meters in the thermal infrared band). Data from Landsat are transmitted directly to ground receiving stations around the world. Eight foreign nations and the European Space Agency (ESA) currently operate ten Landsat ground stations in Argentina, Australia, Brazil, Canada, India, Italy, Japan, South Africa, Sweden, and Thailand. In addition, ground stations are being modified, built, or proposed in Bangladesh, Ecuador, Indonesia, Pakistan, the People's Republic of China, Saudi Arabia, and Upper Volta. Landsat data are recorded, processed, archived, and distributed to users by the agency operating the station under the terms and conditions of Memoranda of Understanding (MOU) with NOAA. Under the MOU, the data received must be distributed on a public, non-discriminatory basis. In exchange for access to transmitted data from the Landsat system, station operators pay an annual access fee of $600,000 and a distribution fee on each data product sold to users.

Annual operating costs for FY 84 were projected to be about $35 million. No significant additional expenditures are associated with transmissions directly to foreign stations.

Each agency establishing a ground station funds its own facilities and operating costs. These costs vary significantly depending on the size, processing throughput, and location, but they range from $1 to $10 or more million dollars in capital investments, plus approximately $1 million in annual operating costs. Access and distribution fee payments to the U.S. from foreign ground stations during Fiscal Year 1984 amounted to approximately $3.3 million.

Foreign Landsat stations have provided the only means for acquiring data over certain areas of the world. Once the Tracking and Data Relay Satellite System (TDRSS) is operational, the U.S. should have global data acquisition capability except over an area of India. However, acquisition capacity of TDRSS is limited and cannot meet all user demands. In addition, NOAA has provided back-up tape recorders in selected foreign ground stations which have provided important access to otherwise unavailable data. Furthermore, the application of Landsat data to resource management abroad has contributed to the development of new techniques which have applicability in the U.S. as well. In foreign countries, Landsat data have provided a unique view of the Earth's resources and have been used in geologic assessment, cartography, land use planning, and other applications.

The U.S. is in the process of commercializing the Landsat system. Until a bidder is selected, and the exact terms and conditions of a contract are known, the impact on future international participation cannot be assessed.

Coordination on Geostationary Meteorological Satellites (CGMS)

The CGMS comprises current and prospective geostationary meteorological satellite operators from the European Space Agency (ESA), India, Japan, U.S., and USSR, as well as representatives from the WMO, which participates in CGMS activities to promote the development of a global meteorological observing system. Dr. John McElroy is the senior U.S. representative to the CGMS.

Since 1973, the work of CGMS has been carried out principally through two technical working groups which work closely together and meet simultaneously or jointly. The Operations Working Group is concerned with the operational aspects of the program, especially data processing and dissemination, and reflects knowledge of user needs in identifying possible areas for commonality of systems. The System Engineering Working Group considers the technical feasibility of suggestions developed by the Operations Working Group and derives means for implementing those suggestions deemed to be feasible and cost-effective.

U.S. participation in CGMS involves sending representatives to the plenary and working group meetings. Our investment is incorporated in ongoing program activities, since the results of CGMS activities contribute to the utility of our geostationary satellite programs and provide technical support to our efforts.

Foreign representatives participate in CGMS activities as well. The European Space Agency, Japan, and India have developed, launched, and operate geostationary satellites which contribute to U.S. weather and climate activities as well as to the regions in which they operate. These activities are part of the respective agency ongoing program budgets and not earmarked specifically for CGMS.

CGMS, an extremely effective organization, is a technical forum which is non-binding on its members. Nonetheless, its work is inherently beneficial to all participants. In the last year there have been several examples of members benefitting from common data formats and system compatibility. When the Japanese GMS failed in the summer of 1984, NOAA was asked if data from our polar orbiter could be transmitted through the weather facsimile system on GMS until a replacement Japanese satellite was launched. The European Space Agency's Meteosat data collection system is about to fail and arrangements are being made to shift a GOES spacecraft, no longer in use by NOAA, so that Europe can use the remaining capacity of the Satellite. When the NOAA GOES-EAST failed, the U.S. substituted both GMS and Meteosat data for some of the data no longer available in a 1 Geostationary Satellite configuration. CGMS will undoubtedly continue and increase in importance as a model for successful scientific and technical cooperation.

Infrared Astronomical Satellite (IRAS)

The launch and operation of the Infrared Astronomical Satellite (IRAS), a cooperative effort of the U.S., the Netherlands and the United Kingdom, was included in last year's report. During FY 84, a catalogue of infrared sources based on the IRAS observations was compiled and released to the world scientific community.

CHAPTER 7 - ENERGY

The continuing goal of U.S. National energy policy is to foster an adequate supply of energy at reasonable costs. It recognizes that adequacy of supply requires a flexible energy system which avoids undue dependence on any single source of supply, either foreign or domestic, and thereby contributes to our national security. It also recognizes that an adequate and flexible energy supply can best be provided through minimal federal involvement in the energy market. The National Energy Policy Plan issued by the Department of Energy in October 1983 and currently in process of revision indicates further that an adequate supply of energy for the United States is not independent of the security of energy supply affecting our allies abroad and that the international dimensions of energy security and emergency preparedness are fundamental aspects of the definition of adequate supply for the U.S. itself.

Recognition of the close connection between U.S. domestic energy policy and the international energy picture is reflected to a significant degree by our wide network of collaborative R&D efforts overseas, particularly in Europe and Japan. Consistent with the need to focus government activity, international programs are being aligned with an appropriate, limited government role. International collaboration in energy technology takes both multilateral and bilateral form. The U.S. is, for example, an active participant in a number of international organizations dealing with energy technology, including: the International Energy Agency (IEA), the International Atomic Energy Agency (IAEA), and the OECD's Nuclear Energy Agency (NEA).

Multilateral Developments

International Energy Agency (IEA)

The IEA was established in 1974 within the framework of the Organization of Economic Cooperation and Development (OECD) as a forum to deal with potential oil disruptions. The IEA's Committee on Research and Development (IEA/CRD) is the special arm of the IEA which seeks to reduce excessive dependence of its member countries on oil, especially oil imports, through energy research and development studies and projects. The U.S. has long supported IEA/CRD programs to accelerate the development of new energy technologies and to increase energy efficiency. These include projects in all the major energy technology sectors, such as: nuclear fusion, fossil fuel utilization, conservation, solar, and other forms of renewable energy.

U.S. participation in the IEA/CRD underscores the U.S. commitment to pursue common objectives in energy R&D, which tend to increase mutually beneficial interdependence among member countries. Mechanisms to promote common objectives include: information and personnel exchange, joint use of facilities, and task sharing. Such common approaches can help research costs to be reduced, thereby effectively stretching each member's energy R&D budget. The Department of Energy (DOE) is a major participant in the R&D activities of IEA committees, particularly the IEA/CRD although advice is also provided to the SLT committee and its various subgroups.

A major IEA/CRD effort during 1984 was the Energy Technology Policy Study (ETPS), which has been published in the form of an Executive Summary. The ETPS evaluates current R&D efforts in light of significant changes in energy markets over the past several years. It will provide a framework for member countries to readjust, if needed, R&D priorities for the remainder of the decade. The study links technology to national goals for energy security, economic performance, improved capability, and ecological preservation. It identifies impediments to achieving energy goals and offers technical and policy approaches to mitigate such impediments. ETPS points out that international collaboration provides certain advantages by sharing risks, costs and benefits through information and cost sharing, particularly in those cases where the next research step is too costly for a single country, where implementation is served by sharing of technical information, or where a technology may have unique transboundary implications.

In the fossile fuels area the IEA/CRD published in 1984 a major technology review on the Clean Uses of Coal.

The United States, West Germany and Japan renewed until 1985 the IEA Hot Dry Rock Geothermal Agreement for an additional two years. In this cooperative project, underway since 1979, Germany and Japan each contribute $2.5 million per year to help defray the costs of conducting fracturing experiments on hot dry rock deep beneath the earth's crust at Fenton Hill, New Mexico and then pumping water down to extract the heat contained in the rock. If this technique can be developed successfully, the three countries will be in a much better position to tap the large amount of energy stored in hot rocks below the earth's surface.

Three superconducting magnetic coils made by U.S. industry, and one each from the European Community, Switzerland and Japan are to be tested under the IEA Large Coil Project Agreement at the Large Coil Test Facility at Oak Ridge National Laboratory.

In 1984, coils from the U.S., Switzerland, and Japan were successfully tested. Research using these coils, which are worth at least $10 million each and the facility over $40 million, is essential to the eventual development of a fusion reactor, which in turn could make a very significant contribution toward all nations' energy independence.

Also in 1984, work began to draft new annexes and IEA agreements in fusion which will open up new and existing facilities in Europe to U.S. participation. For example, EC approval was given in 1984 to proceed with a second Advanced Limiter Test in the German tokamak TEXTOR under the IEA Textor Agreement. Negotiations began for cooperative programs to coordinate research efforts of the three large tokamaks in the world, the U.S. TFTR, the Japanese JT-60, and the European JET. New agreements are also being discussed to coordinate experimental programs in the area of Stellarators and Heliotrons, and for joint work on the German tokamaks, ASDE and ASDEX-Upgrade. These agreements represent the type of joint planning that DOE hopes will increase in the future because they help achieve even greater efficiency in the use of resources and increase opportunities for new breakthroughs in fusion research.

DOE has also participated in workshops and conferences, to enhance the exchange of information among researchers. In 1984, two highly successful workshops were held at Trondheim, Norway on enhanced oil recovery and two phase flow. These workshops will help form the basis for concrete project proposals for new annexes under existing IEA Agreements.

Nuclear Energy Agency (NEA)

The NEA is a sub-unit of the Organization of Economic Cooperation and Development (OECD) which promotes joint research studies, development projects, and information exchange on nuclear energy technology. The NEA has also continued to play a role in such policy areas as public acceptance of nuclear power, international radiation standards, the nuclear fuel cycle, and safety and licensing.

The U.S. plays a lead role in the NEA. In April 1984 the U.S. hosted a meeting of the NEA Steering Committee in Washington. The U.S. delegate, Ambassador Richard Kennedy, and Secretary of Energy Donald Hodel both stressed at that meeting the importance the U.S. gives to the work of the NEA, including increased attention to policy as well as technical issues confronting the nuclear industry.

The role of nuclear power in the energy mix of NEA member countries has been widely debated over the last several years. In this connection, the U.S. has benefitted from the exchange of information and the experience of other NEA members by jointly identifying the constraints to a greater contribution by nuclear power to the U.S. energy supply. NEA members have joined together to pool experience, conduct joint projects and mingle resources to carry out NEA projects and studies. Involvement in policy studies in 1984 led to closer coordination with other international energy organizations such as the IEA, IAEA, and the OECD Environmental Directorate.

In other developments a useful study publicised by the NEA in late 1983 covered The Cost of Generating Electricity in Nuclear and Coal-Fired Power Stations. Also the problem of funding the completion of the Loss of Fluid Test (LOFT) at the DOE facility in Great Falls, Idaho was solved by a financial contribution by the Federal German Republic and by the entry of Spain into the project with a contribution of $750,000. The U.S. continued its participation in an experimental program of tests at the Stripa Mine in Sweden on nuclear waste storage and in an exchange of civil nuclear data and computer program for the NEA's Data Bank project.

International Atomic Energy Agency (IAEA)

The IAEA, an autonomous agency within the UN system, was founded in 1957 as a result of a proposal made in 1953 by President Eisenhower. Its objectives are to promote the broader use of nuclear energy to enhance peace, health, and prosperity worldwide and to help ensure through administration of the international safeguards system that peaceful nuclear activities are not used to further any military purposes. The U.S. has provided strong support to the IAEA for over 25 years, and President Reagan in his July 16, 1982 nonproliferation policy statement declared that the U.S. will continue to support strongly and work with others to strenghthen the IAEA's objective to provide for an improved international safeguards regime.

That regime, in turn, performs a key role in furthering the aims of the Non-Proliferation Treaty (NPT) in preventing the further spread of nuclear weapons while making available the benefits of nuclear energy for peaceful purposes. The IAEA safeguards program is designed to contribute to the establishment and support of a norm of behavior for the peaceful use of nuclear materials, to deter the diversion of those materials to military purposes, and to detect any such diversion should it occur.

The objectives of the IAEA in enhancing nonproliferation and peaceful uses of nuclear energy coincide with our own and support critical U.S. security and nonproliferation objectives. U.S. participation in IAEA technical programs provide opportunity for the application and furtherance of U.S. science technology.

In the IAEA's budget, an approximate balance is maintained between the safeguards program and the program for technical assistance and cooperation. Other major programs of the IAEA are those for nuclear power and reactors, information and technical services, nuclear fuel cycle and nuclear safety, food and agriculture, life sciences and physical sciences.

The U.S. contribution, both assessed and voluntary to the 1984 IAEA budget and in support of IAEA programs for the year, was $33.8 million.

The U.S. is constantly evaluating IAEA activities through membership on the Board of Governors, participation in the annual General Conference, daily involvement by American nationals in IAEA programs, and legislative review of the U.S. financial contribution.

United States Nuclear Regulatory Commission (NRC)

NRC, primarily through its Office of International Programs and Nuclear Regulatory Research, maintains close and continuing contacts with nuclear regulatory authorities and safety research organizations in both highly industrialized and developing countries, particularly those which are operating or building U.S.-supplied power reactor technology. The NRC formalized efforts in this area in May of 1974 when the NRC as successor agency to the AEC began to conclude two distinct categories of international agreements: the first, bilateral arrangements for the exchange of regulatory information and cooperation in general nuclear safety matters, which are written for five-year periods; the second, bilateral and multilateral arrangements for the exchange of research results and participation in specific programs of research, which vary according to the duration of the project involved.

Regulatory Information Exchange and Cooperation Arrangements (Category 1) provide a mechanism for the timely exchange of significant reactor safety information, serve as official communication channels for information on reactor safety problems and other items of shared interest, and act as the foundation for most of the health and safety assistance that NRC gives to developing countries. NRC is currently engaged in 21 arrangements of this type--with the regulatory

authorities of Belgium, Brazil, China, Denmark, Egypt, Finland, France, the Federal Republic of Germany, Greece, Israel, Italy, Japan, Korea, Mexico, the Netherlands, the Philippines, Spain, Sweden, Switzerland, Taiwan, and the United Kingdom. Three of these--with France, Greece, and Spain--were renewed this year. NRC is also completing the last stages of negotiation on the text of a formal arrangement with Yugoslavia.

Research Arrangements (Category 2), both general and program-specific, often provide for the participation of other countries--through the transfer of money, personnel, equipment, and/or special services--in NRC's ongoing research programs where they gain immediate access to the research results or participate in the development and advancement of related computer codes. In this period of diminishing budgets, such cooperative research projects allow all participants to make maximum use of their research dollars by pooling resources and coordinating planning to avoid duplication of effort. NRC is currently engaged in 37 safety research agreements with 17 countries (Austria, Belgium, Canada, Denmark, Finland, France, the Federal Republic of Germany, Italy, Japan, Korea, the Netherlands, Norway, Spain, Sweden, Switzerland, Taiwan, and the United Kingdom) and 2 international organizations (the European Communities and OECD). These agreements allow for the substantial expansion of NRC's ongoing research programs. They also provide for NRC's reciprocal participation in the research programs of other countries, which are advancing with great strides in both quality and quantity. For example, most of the nuclear safety test information in the area of thermal hydraulics will, in the future, come from such large facilities as ROSA-IV in Japan, UPTF in Germany, and facilities under construction in France and Italy.

NRC Cooperation with Mexico

Under the terms of the Exchange of Technical Information and Cooperation in Nuclear Safety Matters between the US Nuclear Regulatory Commission (NRC) and the Comision Nacional de Seguridad Nuclear y Salvaguardias (CNSNS) of Mexico, NRC worked closely with the CNSNS when radioactively contaminated steel products were discovered in the U.S. and traced to Mexican manufacturers using recycled materials containing pellets of Cobalt-60. The pellets came from a radio-therapy device improperly discarded in a scrapyard in Ciudad Juarez, Mexico. NRC arranged for a staff member to travel to Mexico to advise the CNSNS on the cleanup of the CO-60 contaminated scrapyard. Under the NRC-CNSNS Exchange Arrangement for Cooperation, the NRC Office of International Programs was able to expedite the approval of procedures to return steel products to Mexico along with gaining official permission, through

official diplomatic channels, for American technical personnel to aid the Mexican recovery effort with an aerial survey of the main areas contaminated by the CO-60 pellets. The NRC effort involved considerable cooperation with DOE, the State Department, and the Pan American Health Organization. The swift action and cooperation of all agencies involved allowed for quick retrieval of contaminated products in the U.S. with minimal impact to the public health and safety.

NRC Bilateral Cooperative Agreements

Canada

In February 1984, NRC and Atomic Energy of Canada Limited (AECL) reached agreement concerning Canada's participation in the Severe Accident Research Program, by joining Belgium, F.R. Germany, Italy, Japan, Netherlands, and United Kingdom as a participant. Under this arrangement, Canada will receive relevant NRC codes and data. In return, NRC will receive data from severe fuel damage programs in Canada, and AECL will conduct 3 severe fuel damage tests in the Canadian NRU reactor for NRC. AECL will provide 90 percent of the funding for NRU operations costs relating to these tests. This has an estimated value of about $1,000,000. The access to the NRU reactor for severe fuel damage is important since this facility offers the capability to perform tests with full length fuel, which is not possible in any United States facility. NRC also benefits from the technical input and analyses of AECL personnel.

Finland

During June 1984, agreement was reached with the Imatran Voima Oy (IVO) power company of Finland on information exchange relating to pressurized thermal shock in PWRs. IVO will provide existing mixing data and perform additional experiments and analysis according to NRC specification. Information from research involving materials will also be provided. In return, NRC will provide codes used to model mixing and thermal-hydraulics and materials studies relating to pressurized thermal shock. The IVO mixing data will be a valuable addition to the data base for assessing NRC codes, allowing for more accurate predictions of the potential for pressurized thermal shock.

France

The Commissariat a l'Energie Atomique (CEA) of France and NRC agreed in January, 1984 to an information exchange in the field of radioactive waste management safety programs. There

are general provisions for the exchange of technical reports, experimental data, correspondence, and news letters for nonproprietary and nonprivileged information. The scope includes: (1) high level and transuranics waste; (2) radionuclide migration from repositories; (3) classification, treatment, and disposal of low level waste, and (4) operations methods of low level waste sites. The arrangement has a duration of 5 years. This is the first bilateral arrangement to be concluded by NRC in the area of waste management and should assist the goal of reaching common understanding and/or establishing common practices between countries.

The CEA of France and NRC agreed in April, 1984 on a cooperative arrangement in the field of fast reactor safety research concerning use of the COMMIX code to model decay heat removal. The code will be validated in its ability to model natural circulation. NRC will provide the code to France and assist in its implementation. CEA in turn will provide data and assess the code against experiments conducted in RAPSODIE, TANGARA, SUPERCAVINA, and NAJET. Natural circulation cooling is an essential part of fast reactor safety, and the data from French facilities will be important in assessing the ability of COMMIX to model this phenomenon.

Federal Republic of Germany

An agreement was concluded in November, 1983 with Kernforschungszentrum Karlsruhe (KfK), F.R. Germany concerning fast reactor safety research. KfK will participate in experimental programs at Sandia in the Annular Core Research Reactor over a two year period. KfK will contribute $400,000 to allow an expansion of the test matrix and more extensive post-test examination. Additional staff will be assigned by KfK to Sandia to assist with the conduct of the program. The German contributions will provide for an improved experimental and analytical effort.

An agreement was concluded in March, 1984 with KfK also concerning fast reactor safety research. The SIMMER-II code has been developed at Los Alamos to model fuel behavior during an accident. KfK will provide $100,000 over two years to utilize the code to analyze accident behavior for the German SNR-300 plant design. NRC will receive the results of this work which will be helpful in evaluating the code's application to the analysis of a planned power plant design.

The NRC and KfK agreed in August, 1984 on a cooperative effort in the Heissdampft Reaktor (HDR) in the F.R. Germany. HDR is a unique large scale facility for LWR safety research. The experimental programs covered by the agreement include: (1) response of structures to severe earthquakes; (2) containment response to large break LOCAs; (3) pressurized

thermal shock; (4) fracture mechanics; and (5) environmental qualification of equipment. The NRC will provide $500,000 toward the earthquake efforts experiments. Codes and analytical effort will also be contributed. In return, NRC will receive a large body of unique and valuable experimental data.

Japan

NRC and the Japan Atomic Energy Research Institute (JAERI) concluded an agreement during November, 1983 concerning the Rig of Safety Assessment (ROSA-IV). The facility is currently under construction and the experimental program will begin in 1985. ROSA-IV is designed to model a PWR at 1:48 scale. When complete, it will be the most important facility in the world for investigations of small break LOCAs and transients in PWRs. NRC will contribute advanced instrumentation for measuring fluid flow, along with codes to plan the experiments and evaluate the results. All results from the ROSA-IV program will be available to NRC.

An agreement was concluded in March, 1984 with the Power Reactor and Nuclear Fuel Development Corporation of Japan (PNC) concerning development of the Super System Code (SSC). This code models heat transfer in LMFBRs. PNC will provide $100,000 to extend the capability of SSC to model heat transfer during low flow conditions. PNC will utilize SSC for analyses of the MONJU reactor. This agreement follows a similar 1983 one for SSC development and assessment. PNC has also contributed under a 1983 agreement to LMFBR experiments in the Sandia ACRR reactor.

Switzerland

Agreement was reached in May, 1984 with the Swiss Federal Office of Energy for exchange of information on fracture mechanics and heavy section steel technology. This renews a 4-year agreement concluded in 1979. NRC provides information from its research programs on fracture of reactor pressure vessels and piping for LWRs in exchange for related information from Swiss programs. The efforts are complementary with the NRC work concentrating on experimental validation through use of test specimens and pressurized thermal shock, while the Swiss work is oriented towards more basic laboratory experiments.

The Swiss Federal Office of Energy (BEW) agreed in May, 1984 on a cooperative effort on thermal-hydraulic system codes for PWRs. The NRC will provide TRAC-BWR, COBRA/TF and RELAP5/MOD2. The Swiss Federal Institute for Reactor Research will perform 24 code validation studies during a 4 year period in addition to providing experimental data from the NEPTUN

facility on heat transfer. This is an extension to a similar earlier agreement that expired in July, 1983. The estimated value of the code assessment work to be performed by Switzerland is $1,200,000. The NEPTUN data will also contribute to improved heat transfer modelling in the codes. The assessment work is important in order to apply the codes to analysis of power plant LOCAs and transients to obtain a best estimate of plant response.

United Kingdom

Upon agreement in February 1984, the NRC and the United Kingdom Atomic Energy Authority have continued their cooperative arrangement in the NRC Severe Accident Research Program (SARP) until September 1985, renewing a previous 18 month agreement that expired in September, 1983. UKAEA is providing $950,000 in exchange for access to information developed under the SARP. The UKAEA is also contributing information in corresponding areas of research it is performing. NRC also benefits from the technical input and expertise of UKAEA scientists.

European Atomic Energy Community

Agreement was obtained in December, 1983 with the European Atomic Energy Community (EURATOM) on LMFBR safety research relating to studies of debris bed coolability. This is a supplement to the basic agreement of November, 1980 and provides additional funding of $650,000. The agreement will expire on December 31, 1984. The program utilizes the Sandia ACRR for LMFBR accident studies to define coolability limits of severely damaged fuel. The additional funding beyond the original agreement was obtained to complete the experiments and analysis. NRC, EURATOM, and PNC of Japan are joint participants.

NRC and EURATOM agreed in September, 1984 on cooperation in the field on nuclear safety research based on mutual benefit and reasonable equity and reciprocity. The two parties will make available to each other nuclear safety research information for LWRs and LMFBRs which they have a right to disclose. This renews a similar previous 5 year agreement. The current agreement is also in effect for 5 years, and provides an opportunity to obtain results of programs funded by EURATOM.

DOE Bilateral Agreements

The Department of Energy has begun to explore the possibility of greater international collaboration in energy research and development in order to: accelerate the rate at which the results of energy R&D are achieved; increase the

efficiency of R&D through joint planning which could ultimately lead to joint construction and use of major facilities, and enhance prospects for international energy security through the development of alternative sources of energy. In early September, DOE held discussions with potential European partners to explain DOE's interest in greater collaboration and to seek European views on the possibility of greater cooperation, particularly in areas of research such as fusion and high energy physics.

United Kingdom

In October, 1984, The Secretary of Energy signed a Memorandum of Understanding for collaboration in energy research and development with the United Kingdom. The MOU included a statement of principles upon which bilateral -- and future multilateral -- collaboration can be based. Similar bilateral agreements are being considered with France, Italy, and Germany. Workshops with the U.K. have already taken place on passive solar and waste energy as fuel.

Saudi Arabia

DOE continued its cooperation in the U.S./Saudi Arabia SOLERAS Project. SOLERAS funding totals $100 million divided equally between the two governments. The agreement had been extended an additional three years through January 1986 to permit conclusion of projects, such as the Saudi Solar Village, cooling field tests, water desalinization, solar-controlled, environmental agriculture, cooling laboratories, educational and research activities. Significant achievements resulting from this research include establishment of the world's largest concentrator photovoltaic power station which provides electrification for two Saudi Arabian villages. Cooling engineering field tests have proved successful at higher temperature levels than expected, and the solar desalinization projects promise to provide advanced state-of-the-art concepts in efficiently displacing fossil fuel desalinization of sea water.

Federal Republic of Germany

Under a bilateral agreement with the German Federal Ministry for Research and Technology (BMFT), DOE tested an advanced version of an indirect liquefaction process, the Mobil M process. It was tested at an international, cost-shared pilot plant in Germany that converts methanol into gasoline. The production design target was exceeded by more than 30%. The costs of the project are shared by DOE and the Federal German Government, with each contributing one-third of its costs, and the industrial participant the final third. Mobil Oil Co. provided the process technology. The U.S. government

is to receive a royalty from Mobil if the process proves commercially successful. The pilot plant has provided considerable information on the operation of the fluidized bed reactor and led to modifications which resulted in improved operating efficiency.

DOE and BMFT also signed an agreement on radioactive waste treatment R&D in 1984 under which information is exchanged on processes for high level radioactive waste treatment and on the use of these processes to fabricate isotopic sources of heat and radiation. DOE is to provide borosilicate glass logs made of by-product material Cesium-137 and Strontium-90, which will be emplaced in the Asse salt mine in Germany as part of a program to investigate the effect of heat and radiation in a repository. The German side will contribute up to $7.2 million to fund one-half year of pilot-scale testing at DOE's Pacific Northwest Laboratory. DOE gains valuable technology and operating experience for waste treatment projects such as DOE's West Valley project.

Japan

In 1984, DOE signed an agreement on Three Mile Island (TMI-2) R&D Cooperation with 17 companies representing the utilities, reactor manufacturing, and engineering industries of Japan, and also with the Japan Atomic Energy Research Institute (JAERI). This agreement calls for payment of $18 million by the Japanese to DOE for participation in DOE's research and development efforts on the damaged reactor at Three Mile Island. The Japanese utilities will also provide about 100 man-years of engineering assistance over the next five years. The agreement also provides for the assignment of up to 22 Japanese engineers and scientists over a five-year period. In this way, DOE shares the cost of expensive R&D, and the benefits obtained are more widely and mutually available.

Several other agreements were signed with Japan in 1984. Under the recently signed DOE-JAERI agreement in nuclear physics, DOE is now working with JAERI to develop heavy ion detectors, a multicrystal gamma-ray detector for neutron cross-section measurements, and to advance accelerator and detector technology and research in basic nuclear science. Most of this work is being done at the Argonne and Oak Ridge National Laboratories.

Another agreement concluded in 1984 with JAERI was an Annex to the 1983 fusion agreement. Under this Annex, DOE for the first time has commited to do research in Japan; heretofore, all collaborative experiments under the fusion cooperation had been conducted at DOE facilities. DOE and JAERI are now jointly studying in JAERI's Fusion Neutronic Source facility the behavior of fusion neutrons in a JAERI-made blanket module

and later in a blanket made by DOE and JAERI. DOE benefits by not having to expend funds to build a similar experimental facility in the U.S., and the cooperation will enable additional analysis and experiments to be performed, which JAERI could not afford to have done on its own.

The last agreement DOE concluded with Japan in 1984 was for a cooperative program on the effects of electric fields on non-human primates (papio cynocephalus) resulting from the transmission of high voltage electricity. The Japanese Ministry of International Trade and Industry is to contribute about $1.8 million over five years to support research at the Southwest Research Institute of San Antonio, Texas on this topic.

European Community

DOE also does work for others which does not necessarily fall under an international agreement. For example, in 1984 DOE gave permission for Oak Ridge National Laboratory (ORNL) to test for the Joint European Torus (JET) consortium a beryllium limiter in the ISX-B tokamak at ORNL, at a cost of roughly $2.1 million to the Europeans. In the four-month test period, ORNL conducted a testing program which included a series of studies comparing the performance of beryllium vis-a-vis graphite, the standard limiter material, and a test of beryllium's ability to withstand prolonged exposure to high-energy plasma particles.

Other Programs

DOE has currently twenty active bilateral fossil energy projects underway between the U.S. and nine foreign countries. The foreign countries involved are Brazil, Canada, the Federal Republic of Germany (FRG), Israel, Korea, Japan, Mexico, the Netherlands and Venezuela. These projects promote technology development and information exchange in a number of key areas, including oil recovery techniques and coal utilization and conversion processes. Funding for projects is determined in advance of project activities. Depending on the specific agreement, contributions to funding are provided jointly by other Federal agencies, the other participating countries and in one case by private firms. The agreement with Brazil deals with the subject of underground coal gasification. A new umbrella agreement was signed with Israel in 1984 providing for the exchange of information and personnel. Further projects on renewable energy such as solar, as well as oil shale recovery technics, are under consideration.

CHAPTER 8 - ENVIRONMENT, NATURAL RESOURCES AND POPULATION

The American public in general, as well as many private non-governmental organizations and institutions, are broadly and deeply concerned with the interrelated issues of environment, natural resources, and population. The United States Government has continued to respond in 1984 with a wide range of policies and programs, both domestic and international in an attempt to deal with problems of global concern, including atmospheric and oceanic pollution, conservation and sustainable use of threatened or endangered natural resources, and the pressures of growing population on the environment and resources. Many U.S. international programs in these areas are in fact an outgrowth of domestic activities. Most environmental pollution issues are shared among both industrialized and developing countries. In the natural resources area, however, the focus tends to be on developing countries, where environmental, resource and population pressures are the most acute and where the knowledge, technical ability and financial capacity required to deal with them is most lacking. Within the limits of its own resources, the United States seeks to lend its scientific and technological expertise toward relieving these global pressures, in a sense of mutual responsibility and in the shared interest of lessening the international tensions they can generate.

Acid Rain

Transboundary air pollution, particularly acid deposition, has been a widespread concern. Research and policy issues involved have received an exceptional degree of publicity and discussion within domestic, bilateral, and multilateral fora. Although calls for action were often voiced, the principal international activities during much of this period focused on research, monitoring, and information exchange; this research activity, of course, continues.

However, 1984 was noteworthy with respect to the intensity and frequency of calls for coordinated international action to deal with transboundary air pollution. A number of major international meetings took place; the most important were the Multilateral Air Pollution Conference hosted by the Federal Republic of Germany in Munich in June and the Second Session of the Executive Body for the Long-range Transboundary Air Pollution Convention (LRTAP Convention) in Geneva in September. (The LRTAP Convention entered into force for the United States on March 16, 1983.)

Norway proposed a draft protocol to the LRTAP Convention during the Executive Body meeting in September. If adopted by the Executive Body and accepted voluntarily by individual countries, the protocol would require those countries to reduce their national sulfur dioxide emissions (or their related transboundary fluxes) by at least 30 per cent by 1993, using 1980 as the base year for calculating the emissions reductions. The proposed draft protocol in its present form does not provide credit for past emissions reductions (prior to 1980) for countries, such as the United States, which have such reductions. Nor does it take into account the type of air pollution regulatory mechanism in place in the United States. The United States controls adverse impacts of air pollutants by establishing air quality standards and then reduces emissions as necessary under State Implementation Plans to meet these standards. In other words, the primary regulatory system in the United States works from local effect to cause and not from cause to effect; there is no provision in the Clean Air Act for reducing sulfur dioxide emissions per se. Under these circumstances, the United states has indicated that it cannot sign a sulfur dioxide reduction protocol at this time.

On the research front, the Interagency Task Force on Acid Precipitation, established in 1980 by Title VII of the Energy Security Act, coordinates a comprehensive National Program. An important element of this program is the required coordination of the U.S. National Program with related research in other countries. To this end, the Task Force established an International Activities Task Group (Group J), chaired by the Department of State, to encourage international cooperation on acid deposition research and monitoring. Goals of the International Activities Task Group are to:

-- Encourage and facilitate productive interaction between the U.S. National Program and other nations conducting acid deposition research and monitoring activities.

-- Assist the Task Force and its Research Coordination Council in tracking international cooperative efforts.

-- Recommend to the Task Force ways to improve international cooperation and identify opportunities to work with other nations toward common research goals.

-- Inform the Task Force of activities, meetings, and developments in other nations.

The Task Force and its Canadian counterpart, the Federal-Provincial Research and Monitoring Coordinating Committee (RMCC), have initiated a series of cooperative acid deposition research projects. One of the first projects to be undertaken was CAPTEX (Cross Appalachian Tracer Experiment), a joint experiment expected to develop information about long-range paths of air pollutants over eastern North America. Inert tracers were released in September and October 1983 from Dayton, Ohio, and Sudbury, Ontario, and were detected at experimental stations in eastern North America. The results are expected to be available in 1985 following the necessary scienctific review which is now taking place. A review meeting of the Task Force and the Canadian RMCC took place in the spring of 1984 to check on the cooperative research projects. The progress was favorable, and this undertaking is to continue. Even though policy differences exist between our two governments about how best to deal with the acid rain problem, this cooperative research program is expected to provide a flow of useful information to the scientists of both countries.

The Secretary of State meets periodically with the Canadian External Affairs Minister to review the status of the acid rain issue. The Canadian Government previously made a proposal to require mutual reductions of allowable levels of sulfur dioxide emissions by 50 per cent by 1990. Given the questions remaining in the current state of the relevant science, and given the important costs and conflicting domestic interests involved, the Administration has determined that additional research is required to reduce scientific uncertainties and to fill existing gaps in our knowledge about acid deposition. Accordingly, the Administration cannot now agree to any percentage reduction plans for emissions. However, the door is not closed. As soon as the Administration has the information necessary for making a responsible decision responsive to both the bilateral and domestic concerns involved, the issue of any further action dealing with the acid rain problem will be reviewed again.

Ozone

The United States has maintained its leadership role in fostering international cooperation in research, monitoring, and regulation for protecting the global environment from the harmful effects of chlorofluorocarbon (CFC) emissions. Excessive CFCs affect the environment in three ways: (1) by depleting the ozone layer, which allows increased ultra-violet radiation from the sun to enter the atmosphere; (2) by altering the vertical distribution of ozone in the atmosphere, which could have major climatic impact, and (3) by absorbing infrared radiation reflected off the earth's surface, thus contributing to the global warming trend.

One important activity in 1984 was U.S. participation in the efforts of a United Nations Environment Program (UNEP) Working Group to negotiate a global Convention for the Protection of the Ozone Layer. It is hoped that a Convention can be ready for signature at a Diplomatic Conference in March 1985. In these negotiations the United States has also actively participated in the development of a draft protocol to the Convention to reduce substantially aerosol uses of CFCs worldwide. The United States banned nonessential aerosol propellant uses of CFCs in 1978 and has found this to be a cost-effective way of achieving a substantial reduction in CFC emissions. Given the global nature of this problem, multilaterally-agreed controls would be much more effective in reducing global CFC emissions than would unilateral domestic regulation. However, there are substantial differences of opinion between countries on how best to reduce CFC emissions in the future.

UNEP Regional Seas Program

During 1984, the United States continued to participate in the negotiation of regional marine environmental agreements under the UNEP Regional Seas Program. On September 6, the United States ratified the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, called the "Cartagena Convention" for the city in Colombia where it was signed in March 1983. (A Protocol on Cooperation in Combatting Oil Spills was signed by the United States at the same time.) The U.S. ratification was the first; eight more are required for the Convention to enter into force.

The Cartagena Convention is typical of the pattern developed under the Regional Seas Program, consisting of general obligations which are to be defined by detailed protocols dealing with specific areas. Through 1984, the United States spent $685,000 on aid to environmental projects in the Caribbean which are part of the UNEP Caribbean Action Plan related to the Convention. Current USAID environmental projects in the Caribbean Basin are valued at $115 million.

A third negotiating session in New Caledonia in September 1984 continued work on an environmental convention for the South Pacific. In the negotiations, agreement was reached on a Pollution Emergency Protocol. The questions of nuclear weapons testing, radioactive waste disposal, and the precise area of application of the Convention remained unresolved. However, suffficiently important progress was made on the Convention and dumping protocols to warrant continuing efforts to reach agreement. A fourth negotiating session is scheduled for August 1985.

London Dumping Convention

The 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, known as the London Dumping Convention (LDC), is the major international legal instrument for the regulation of ocean dumping. The United States ratified the LDC April 29, 1974 and the agreement entered into force August 30, 1975.

At the Eighth Consultative Meeting of Contracting Parties to the LDC in February 1984, a consensus was reached on two difficult questions regarding nuclear wastes -- disposal into the seabed of high-level radioactive wastes and a proposal to ban ocean dumping of all radioactive wastes. On the former, Parties set aside for the time being their conflicting views on the legal status of disposal into the seabed of high-level radioactive waste and agreed that "no such disposal should take place unless and until it is proved to be technically feasible and environmentally acceptable, including a determination that such waste can be effectively isolated from the marine environment, and a regulatory mechanism is elaborated under the London Dumping Convention to govern the disposal into the seabed of such radioactive waste." On the proposal by two Pacific island states, Kiribati and Nauru, to ban all ocean dumping of nuclear waste, terms of reference were adopted for a study of relevant scientific and technical considerations. The study is to be performed by designees of the International Council of Scientific Unions (ICSU) and the International Atomic Energy Agency (IAEA). A meeting of government-designated experts is to review this study and report to the Ninth Consultative Meeting in September 1985.

Other International Activity on Radioactive Waste Dumping

The Nuclear Energy Agency (NEA) of the Organization for Economic Cooperation and Development (OECD) is engaged in a long-term study of sub-seabed emplacement of high-level radioactive wastes. The NEA also monitors the use of the North Atlantic low-level radioactive waste dump site and is currently reviewing the site's continuing suitability. A working group of the International Atomic Energy Agency (IAEA) met in September 1984 to review the definition of high-level radioactive waste; the group did not complete its work and will meet again in January 1985. Another ad hoc group of the IAEA is working on a definition of levels of radiation not subject to control.

Chemicals

The development of differing chemical regulations by various countries affects international trade in chemicals as well as national chemical industries. To avoid potential international trade barriers, it is essential to concentrate on the international harmonization of approaches to national chemical regulation. Additionally, nations benefit significantly from the exchange of data and assessment techniques.

The United States contributes to the international harmonization of approaches by promoting technical expertise and by sharing its experience in chemical review and control. Moreover, U.S. participation in these international activities benefits our domestic chemical program.

The goals of U.S. participation in international chemical programs include:

-- Eliminating and/or preventing the development of obstacles to trade.

-- Protecting health and the environment in the United States and contributing to international environmental quality through cooperation with other governments on environmental problems of an international or global nature.

-- Exchanging data and assessment methodologies and sharing expertise gained in national toxic substances programs.

-- Developing testing and assessment methodologies that are recognized internationally.

-- Conserving scarce testing resources by avoiding duplicative testing.

Perhaps the most visible and successful of these international efforts has been the Chemicals Program of the OECD. Under U.S. leadership, the OECD began a program in 1977 to harmonize its member countries' approaches to toxic substances control.

A major accomplishment of the OECD program was the adoption in April, 1984, of a Council Recommendation concerning Information Exchange Related to Export of Banned or Severely Restricted Chemicals. If a chemical that has been banned or severely restricted is exported, the country of export will

notify the country of import. The United States already has a similar system in place, e.g., under authority of Section 12 of the Toxic Substances Control Act (TSCA), and is looking forward to the receipt of notices from other countries.

Additionally, the United States is the lead country for a new OECD initiative on existing chemicals, the Switchboard Program, a referral system which will improve access by member countries to unpublished information held in other member countries. Also, U.S. experts made significant contributions to the development of a common format for chemical reviews, which will facilitate the exchange of information, and to the development of methods for setting priorities in the selection of testing candidates and determining when available data on chemicals are inadequate for assessment.

Recent activities in the Chemicals Group have resulted in the development of and support for Guiding Principles on Exchange of Information Related to the Export of Banned or Severely Restricted Chemicals.

The United States also participates in several United Nations programs related to chemicals, such as the International Register of Potentially Toxic Chemicals (IRPTC) of UNEP. The basic objective of the IRPTC is to promote more efficient use of national and international resources in the evaluation and control of chemical risks. Toward this end, the IRPTC provides access to existing data and distributes information on national and international policies, regulatory measures, and standards.

The IRPTC also is responsible for certain functions related to government-to-government information exchange on actions concerning banned or severely restricted chemicals called for under a Provisional Notification Scheme for Banned or Severely Restricted Chemicals adopted by member countries of UNEP in May, 1984. This UNEP Provisional Scheme is similar to the recent OECD arrangement described earlier for Information Exchange Related to Export of Banned or Severely Restricted Chemicals.

The United States (through HHS and EPA) continued its active involvement in the UN International Program on Chemical Safety (IPCS) in 1984. The IPCS, a cooperative effort of the World Health Organization (WHO), UNEP, and the International Labor Organization (ILO), produced IPCS guidance documents on: (1) evaluation of the effects that certain chemicals may have on human health and the environment, (2) methods for evaluating the toxicity of chemicals, (3) evaluations of the toxicity and

acceptable daily intakes of food additives and pesticide residues in food, (4) methods for responding to chemical emergencies and for remedial action, and (5) other priority issues on chemical safety.

At a higher level in the UN system, the UN General Assembly has adopted a series of related resolutions calling for preparation of a consolidated list of harmful products in international trade. The first such resolution was 37/137 adopted in December, 1982, which the United States voted against for substantive and financial reasons. The broad goal is to assist countries, particularly those which lack an adequate regulatory infrastructure, to obtain needed information. The United States supports the concept of information exchange between governments on appropriate regulatory actions, e.g., the United States provides such information to other government on its regulatory actions with respect to banned or severely restricted chemicals. The United States, however, does not believe that the consolidated list being developed in response to resolution 37/137 et seq. in its present form will effectively achieve the desired goal. Indeed it is possible that the present form of the consolidated list could result in trade barriers either indirectly (e.g., by an inappropriate administrative use) or directly (e.g., should a country pass national regulatory legislation based on the simple fact that an item is included on the list).

Further, the form of the present list is duplicative in that expertise and effective mechanisms for distribution of the kind of information which would help those countries which lack adequate regulatory infrastructures, including any such developing countries, already exist in the specialized agencies of the UN system -- the WHO, the Food and Agriculture Organization (FAO), UNEP, etc. The United States believes these specialized UN agencies should be called on to meet the goal of resolution 37/137.

To this end, the United States has suggested a more helpful approach. The United States believes that a list prepared in the form of a "directory" (i.e., pointing to the specific UN specialized agency or other authority which is able to provide accurate and complete information) would be a realistic and cost effective approach to helping countries obtain the information they require. In this regard, the United States continues to work closely with the UN Secretary General.

Chemicals are a subject of high priority in bilateral discussions between the United States and the European Community (EC). Recent discussions have focussed on problems arising from differing approaches to chemicals management under the TSCA and EC's Sixth Amendment. Negotiations are underway concerning the protection of confidential chemical data submitted to the EC under its notification program. The United States currently maintains the confidentiality of data, and the EC is developing means to accommodate U.S. concerns on this issue.

Pesticides

The United States continues to implement its responsibility for pesticide export notification and notices to other countries of major regulatory action under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). EPA commissioned a study of the effectiveness of the notices and is in the process of implementing the study's reccmmendations for improvement. Additionally, the United States has had significant success in promoting the adoption of similar notification requirements by other countries. Notification systems have been agreed to in the OECD and provisionally in UNEP.

The United States maintains active participation in the Codex Alimentarius Commission of WHO and FAO, which sets standards for pesticide residues and food additives. In this organization, EPA's participation furthers international pesticide tolerance harmonization efforts. At the 1984 Session of the Codex Commission on Pesticide Residues, the U.S. provided analysis for the 33 pesticides for which international tolerances were proposed and participated in discussions on numerous other related subjects (such as guidelines for maximum residue levels for animal products and how to express residues in regulations). Scientists from EPA have recently participated in international evaluations of scientific data which support additional international tolerance proposals. These on-going international efforts continue to promote consumer safety and international trade in foodstuffs.

Transboundary Movement of Hazardous Waste

The problems associated with hazardous waste and the need for good management have created an environmental and health issue which has been receiving increasing attention over the past several years. Considerable attention has also been given to the question of the responsibility of the United States and

other industrialized nations for the transboundary movement of hazardous waste. Besides the United States, many other countries also recognize the need for good hazardous waste management, and their concerns are reflected in several ongoing projects within international organizations, including the OECD and UNEP.

Under the 1980 Resource Conservation and Recovery Act (RCRA), the United States had no regulatory authority to prevent the export of hazardous waste. However, EPA established a notification system in recognition of the potential environmental, health, and foreign policy problems that may arise from such exports. Under the existing regulations, EPA implemented the notification system, and since the regulations went into effect in 1980 EPA received approximately 370 notices of waste export, mostly for Canada.

The United States hazardous waste export policy will undergo a major change as a result of passage of the 1984 amendments to the RCRA reauthorization bill. The legislation calls for prior notice of export and the receiving country's prior written consent before a shipment of U.S.-generated waste can take place. There is also an important provision for existing bilateral agreements between the United States and other countries which will eliminate requiring prior written consent of the receiving country for each shipment. This mechanism should help ensure that the regulations do not hamper legitimate trade in hazardous waste across national frontiers.

The United States has played an active and constructive role in the hazardous waste activities of the OECD and UNEP. It will have a major role in developing the next steps to implement the OECD Council Decision and Recommendation on the transboundary movement of hazardous waste. The United States also expects to contribute significantly to UNEP's consideration and discussion of a second draft of proposed guidelines on the good management of hazardous waste.

U.S.-Canada Water Agreements

In September 1984, EPA and Canadian environmental experts met to discuss phosphorus load reduction goals for Lake Ontario set in the Annex 3 supplement to the 1978 Great Lakes Water Quality Agreement. They reached agreement on scientific data indicating that necessary reductions will be somewhat smaller than earlier projected. Negotiations on the allocation of those phosphorus reductions between the United States and Canada are likely to be an important item during the next year.

U.S. and Canadian representatives held a successful consultation regarding the problem of Niagara River toxic chemical pollution in June 1984. Agreement was reached to revive a joint technical committee to consider Niagara and similar problems.

In the past year, the United States and Canada reached agreement on two other transboundary water issues which caused continued concern to both countries:

(1) In March 1984, the two governments signed an Annex to the 1972 Exchange of Notes which established the Joint Committee on Water Quality in the St. John River. The purpose of this Annex will be to ensure binational cooperation in the development, coordination, and implementation of measures necessary to meet water quality objectives in the river.

(2) The Skagit River Treaty, signed by the United States and Canada on April 2, 1984, should resolve the long-standing dispute between the City of Seattle and the Province of British Columbia over the proposed raising of the Ross Dam. Under the terms of this agreement, Seattle will abandon its plans that would have involved flooding the Skagit River Valley. In return, British Columbia will supply Seattle with the quantity of power which would have been generated by raising the dam.

In cooperation with the Department of State and other federal, state, and local agencies, EPA headquarters and regional personnel continue to play an active role in working to resolve water pollution problems along the U.S.-Canadian border. Issues which may be addressed in the upcoming year include: (1) the Garrison Diversion Unit, a multi-purpose resource project in North Dakota, (2) Flathead River-Cabin Creek, a proposed "open pit" coal mining operation in British Columbia, and (3) toxic pollution problems in the Niagara River and other Great Lakes connecting waters.

U.S.-Mexico Border Environmental Cooperation Agreement

The United States and Mexico continue to face a number of transboundary pollution problems. Of particular concern to the U.S. have been (1) the discharges of raw sewage and industrial wastes from Mexican communities to rivers and oceans affecting the United States, (2) continuing air pollution problems at El Paso/Cuidad Juarez, and (3) the proposed construction and expansion of Mexican copper smelters at Cananea and Nacozari, Sonora.

The Framework Agreement on Border Environment Cooperation, signed in August 1983, by Presidents Reagan and de la Madrid, was ratified by the Mexican Senate in December 1983 and became effective as of February 1984. This agreement designated EPA in the United States and the Secretariat for Urban Development and Ecology (SEDUE) in Mexico as the two agencies in charge of further developing and implementing the agreement. The agreement also calls for an annual high-level meeting of the delegations chaired by the Department of State and the Mexican Secretariat of Foreign Affairs.

In March 1984, delegations from both countries met in San Diego and Tijuana for the first "National Coordinators" meeting under the 1983 Agreement. The U.S. delegation included members from the International Boundary Water Commission (IBWC) and the Department of State, as well as EPA. The two sides agreed on the establishment of three technical work groups (air quality, water quality and soils management) to review problem areas along the border, to develop technical and cost information, and to recommend possible corrective measures. The water quality work group held its first meeting on May 29-31, 1984 in San Francisco. The air quality and soils management work groups held their first meeting in Reynoso, Mexico November 6-9, 1984.

In addition, in November 1983 and again in July 1984, U.S. delegations visited the border to inspect problems areas at San Diego/Tijuana, Calexico/Mexicali, Nogales/Nogales, Laredo/Nuevo Laredo, El Paso/Ciudad Juarez, Bisbee/Naco, and Douglas/Aqua Prieta.

The major problem to be solved by the water quality working group is an agreement on the construction of an international sewage treatment plant in the San Diego/Tijuana area. Millions of gallons a day of raw sewage from Tijuana have been deposited on U.S. beaches and have led to quarantines of U.S. beaches and endangered the health of population on both sides of the border. It is hoped an agreement with Mexico will be reached to share in the building of appropriate facilities to control this problem.

In preparation for the second meeting of the National Coordinators (tentatively scheduled for January 1985), U.S. and Mexican technical experts will continue their efforts to determine areas for both unilateral and cooperative action. Once agreement on a particular issue has been reached, the parties will draft an Annex (i.e., a specialized sub-agreement) to the 1983 Agreement. It is hoped to develop an annex on the construction of the international sewage treatment plant at the next National Coordinators' meeting. The U.S. Congress has appropriated $5 million for the design of treatment facilities contingent upon agreements between the two countries.

The National Coordinators' meeting will be followed by the annual high-level delegation meeting that will review reports by the National Coordinators on programs designed to reach solutions on current border environmental problems. The two delegations will also prepare an action plan for 1985.

Other Bilateral Cooperative Arrangements

Federal Republic of Germany

Cooperation with West German organizations and environmental specialists continues to be one of the mainstays of EPA's international program. Contacts and exchanges take place both under the U.S.-FRG Agreement on Environmental Cooperation and in the context of multilateral fora such as the OECD, the Economic Commission for Europe (ECE), and the NATO Committee on the Challenges of Modern Society. Management of hazardous wastes, air pollution control technologies, research on acid deposition and its ecological effects, more efficient regulatory approaches, and economic incentives for environmental protection are among the subjects of current work involving experts from both countries. Particularly on the topic of air pollution, the FRG has taken a leading role. The FRG sponsored a major international East-West meeting, held in Munich in June, on damage to forests and waters through air pollution, and it has worked hard to encourage major industrialized nations to effect additional control on sources of air pollution. The FRG also has led the way within the European Community to introduce lead-free gasoline and catalytic converters as a means of controlling oxides of nitrogen from mobile sources; much of the West German work in this area derived from information on U.S. experience gained from EPA.

Japan

The U.S.-Japan Agreement on Environmental Cooperation was signed in 1975 and extended in 1980 for an additional five-year period. EPA and the Japanese Environment Agency (EA) exercise general oversight for the Agreement and provide co-chairmen for many of the 14 projects which operate under the Agreement. The Executive Secretaries for the Agreement also are affiliated with the EPA and EA. Other agencies of both Governments (CEQ, FDA, and the Corps of Engineers for the U.S. side) chair projects under the Agreement, and State/Prefectural and local government officials participate as delegation members. The projects successfully promote the exchange of new technologies, practical experience, and data on a broad array of priority environmental issues, not only during panel meetings but also in the periods between these meetings. While joint scientific research projects are not initiated, the results of research carried out by either side for domestic programs are shared, allowing participants to avoid costly duplication of effort.

A yearly Joint Planning and Coordinating Committee Meeting (JCCM) provides oversight for project activities and allows the reshaping of current projects to new domestic priorities and the addition of new projects to the Agreement. In February 1984 EPA Administrator Ruckelshaus led an EPA delegation to Japan for the Fifth JCCM. During those deliberations, projects were modified to meet current needs and three new projects were introduced for possible addition to the 14 already underway. If negotiations on project content are successful, these three new projects will be ratified at the Spring 1985 JCCM to be held in Washington, D.C. These new ideas for cooperation, identified at the JCCM and since pursued by technical representatives, illustrate the vitality of the Agreement and the adaptability of its participants. At the 1984 JCCM both the EPA and EA strongly endorsed an additional five-year extension of the Agreement at the 1985 Joint Meeting.

Six project meetings were also held in the United States or Japan during this period. Project meetings are scheduled according to the 18-24 month mandated time-frame, and an active technical exchange continues in the interim period between meetings.

Activities under the Agreement are useful and cost-effective for all participants, and the Agreement provides an excellent way for each side to tap into the expertise of the other. As in the past, close personal and professional ties fostered by continuing interaction under the Agreement have laid a foundation for a partnership that allows both sides to benefit from the strengths of the other. More broadly, they have fostered an understanding between the two nations that has proven extremely useful in both bilateral and multilateral fora.

China

Thirteen man-months of exchanges in FY 1984 brought Chinese and American scientists together in an ongoing study of the relationship between lung cancer and coal combustion. A large quantity of environmental samples were collected and subjected to a variety of chemical and toxicological analyses; the two sides also laid the groundwork for associated epidemiological studies. American and Chinese specialists also initiated joint studies on the transport and transformation of airborne pollutants. EPA's Deputy Administrator and a team of policy-level officials visited China to review the first five years of cooperation under the Environmental Protection Protocol and to consider new areas of joint work, including environmental management and acid rain. On November 30, a new five-year extention of the U.S./China Environmental Protection Agreement was signed by Mr. Ruckelshaus representing the U.S. and the Chinese Ambassador to the U.S. representing China.

Soviet Union*

Highlighting cooperation under the U.S.-USSR Environmental Agreement in FY 1984 were two joint research expeditions aboard Soviet vessels. One cruise studied the composition and behavior of atmospheric trace gases in the open ocean; the other focused on ecological baseline parameters in the Bering Sea. Exchanges of specialists and joint research proceeded in such diverse areas as aquaculture, marine mammal ecology, terrestrial plant and animal ecology, pesticide transport and transformation, climatic effects of atmospheric pollution, water quality modeling, aquatic toxicology, and earthquake prediction. In June 1984, EPA Administrator Ruckelshaus was designated U.S. Co-Chairman of the U.S.-USSR Environmental Joint Committee and met with his Soviet counterpart at a multilateral environmental conference in Munich.

France

The French Ministry of the Environment and EPA began discussions in fall 1983 on the possibility of developing an agency-to-agency Memorandum of Understanding (MOU) on environmental cooperation. In June 1984 the EPA Administrator and the French Environment Minister signed such a MOU. Since that signing six projects of mutual interest--Artificial Long-Term Storage of Hazardous Waste; Destruction and Clean-up of Hazardous Waste; Industrial Wastewater Treatment; Sludges; Aerosols; and Particulate Emissions--have been earmarked for implementation under the MOU. EPA has named technical contact people for each project as has the Ministry. In addition, EPA personnel have taken the first step toward initiating these projects by contacting their French counterparts with ideas on project content which reflect EPA domestic priorities.

The Netherlands

Bilateral environmental cooperation with the Netherlands takes place within the framework of a Memorandum of Understanding between EPA and the Netherlands Ministry of Physical Planning, Housing, and the Environment (MVROM), which is the successor to the Ministry of Public Health and Environment. A joint seminar on environmental management was held in Washington in April, 1984, generating followup activities in a number of key areas such as increased efficiency in environmental management, reduction of unnecessary regulatory burdens, and incentives to private sector participation. An international Symposium on Aerosols,

*See also Chapter 4, "U.S.S.R."

co-sponsored by EPA and MVROM, is scheduled to take place at Williamsburg, Virginia May 20-24, 1985, following on the highly successful Symposium on Oxides of Nitrogen held in Maastricht, the Netherlands, in May, 1982. EPA and MVROM are negotiating the terms of a second five-year Memorandum of Understanding to be signed in 1985.

European Community

Under a 1974 agreement between the Department of State and the European Community Commission, consultations on environmental issues were held in Washington in February 1984. Topics included the policy and regulatory aspects of acid rain, toxic chemicals, hazardous wastes and the management of environmental risks. Information on these and other environmental problems is exchanged regularly so that the U.S. and the EC countries are aware of major environmental policy developments that may affect political and economic relationships.

United Nations Environment Program (UNEP)

UNEP continued in 1984 to pursue its basic mandate of catalyzing and coordinating international efforts, especially within the UN system, to deal with environmental and natural resource issues of common interest. The United States maintained its active involvement in UNEP, continuing to serve on the 58-nation Governing Council and making a voluntary contribution of $10 million for FY 1984 to the Environment Fund which finances UNEP's program activities. (This represented over 30 percent of the total contributed to the Fund.)

The Twelfth Session of the Governing Council was held May 16-29, 1984 in UNEP's new headquarters in Nairobi, Kenya. It was marked by a continuation of the trend set in 1983 toward a more realistic, businesslike and non-politicized approach to UNEP administration and program management. The Council agreed on a set of program priorities generally reflecting significant U.S. interests and concerns. These include: (1) the Global Environmental Monitoring System (GEMS) which compiles, analyses and distributes data on worldwide conditions and trends in various environmental media; (2) the Regional Seas Program, designed to develop and promote pollution control and environmental management agreements among littoral countries of specified ocean regions; (3) implementation of the 1977 Action Plan to Combat Desertification; (4) the Environmental Law Program, including, inter alia, negotiation of a convention on protecting the atmospheric ozone layer and development of guidelines on international transfers of hazardous substances

and environmental impact assessment (EIA), and (5) the Environmental Information Program. (The United States subsequently hosted, in Washington, June 26-29, the first meeting of the Environmental Law Program to consider environmental impact assessment guidelines.)

Also supportive of U.S. policy, the Council devoted special attention to the emerging issue of biological diversity protection, while calling for elimination, or at least reduction, of marginal and duplicative UNEP programs in fields such as natural disasters and human settlements. A parallel decision set a lowered--and more realistic--program budget ceiling of $50 million for the 1986-87 biennium and sought to attune the Council's consideration of the budget and future program priorities.

Other significant Governing Council decisions included one stemming from a U.S. initiative that called for revamping UNEP's institutional arrangements on desertification. This reform should produce more efficient use of funds and staff in promoting and coordinating implementation of the 1977 Desertification Action Plan.

Also, the Council made some headway in clarifying the relationship between the independent World Commission on Environment and Development (WCED) and the intergovernmental committee organized within UNEP to coordinate the preparation of an environmental perspective to the year 2000 and beyond. The intergovernmental committee prepared a statement of "expectations" regarding issues to be addressed which the WCED agreed to consider as it developed its program of work. EPA Administrator Ruckelshaus was appointed to membership on the Commission by WCED Chairman Gro Harlem Brundtland of Norway; Mr. Ruckelshaus was appointed in his personal capacity and will remain in the Commission after his resignation from EPA..

Besides the high priority programs mentioned above, the United States continued to support and participate actively in other ongoing UNEP programs considered worthwhile, among them the International Register of Potentially Toxic Chemicals (IRPTC), UNEP's environmental information referral service, INFOTERRA, the Industry and Environment Program, and the technical Coordinating Committee on the Ozone Layer (CCOL).

In another UNEP-related area, the U.S. made substantial contributions to preparations for the World Industry Conference on Environmental Management (WICEM) held in Versailles, France, November 14-16, 1984. The overall objective of this UNEP-sponsored conference was to strengthen commitment to effective environmental planning and management and to consider how industry might contribute more fully and effectively to

environmentally sound development. EPA Administrator Ruckelshaus was one of the conveners for WICEM, which resulted to a significant degree from a U.S. initiative in support of greater private sector involvement in international environmental affairs.

U.S.-Panama Joint Commission on the Environment

The U.S.-Panama Joint Commission on the Environment (JCE), established under the 1977 Panama Canal Treaty, carried forward the revitalization which began early in 1983. The six-member Commission (three members from each country) met on a regular quarterly basis from March 1983 through mid-1984 in fulfillment of its primary mandate to develop recommendations for avoiding or mitigating adverse environmental impacts resulting from implementation of the treaty.

In these meetings, the JCE devoted special attention to certain components of its Comprehensive Management Plan for the Canal Watershed, particularly a program of environmental education in the area and enforcement of existing Panamanian legislation to prevent further deterioration of the watershed. They also took steps toward establishing the position of a Commission "Coordinator" who would be responsible for 1) bringing together all resources and available information from existing Panamanian environmental agencies and 2) implementing the environemntal education program. The Panamanian Defense Forces (PDF) concurred in the Commission's selection of law enforcement in the watershed area as a priority recommendation and submitted a detailed plan for the establishment of a system of forest wardens, subject to the availability of financing.

U.S. Man and the Biosphere Program

The United States Man and the Biosphere Program (U.S. MAB) is an intergovernmental program which works to provide the scientific basis for harmonious relationships between people and the ecosystems upon which their livelihood and well-being depend. The U.S. is one of 104 nations to establish a MAB program and to participate in this international effort on environmental research, education, and training, which grew out of the 1970 UNESCO General Conference.

The Secretariat for the U.S. program is located in the Bureau of Oceans and International Environmental and Scientific Affairs (OES) of the Department of State. The year 1984 has been a period of evaluation, planning, program definition and expansion. The U.S. National Committee for MAB, composed of public and private sector members and headed by Dr. Paul T. Baker of Pennsylvania State University, reviewed alternative

institutional homes for the Secretariat and decided, partly on the basis of the international scientific nature of the program, that the Department of State continues to offer the best location for U.S. MAB within the federal establishment.

In its program evaluation efforts, the U.S. National Committee met with representatives of all 10 active U.S. MAB Directorates, reviewed the progress of their programs, agreed on general guidelines for future program direction, and established project funding criteria. Additionally, the National Aeronautics and Space Administration (NASA) provided a financial contribution to U.S. MAB for the first time, thus joining the Department of State, the National Park Service (Department of Interior) and the Forest Service (Department of Agriculture) as principal sponsoring agencies. In total, the program budget, which was limited to only $90,000 in FY 83, increased during FY 84 to over $236,000.

Nearly seventy percent (70%) of these funds were allocated to support a range of international research efforts, including studies, preliminary research project design work and seminars and workshops. The major research areas funded in FY 84 emphasized, in particular, the relationship between land use, water quality and stress on coastal ecosystems in tropical islands; pilot background monitoring of global pollution; the utilization of forest ecosystem data bases for developing ground truth values and for developing regional models for high altitude remote sensing systems, and nitrogen availability and nitrogen cycling in intensively managed pine forests.

In addition, smaller scale studies were supported on such topics as the development of alternative strategies for coping with severe/sustained drought; the collection of baseline data on natural areas and biosphere reserves, and the analysis of existing environmental data bases for application to the management of river and bay estuarine sanctuary systems.

U.S. MAB international education and training programs were assisted through funds allocated to support workshops on U.S.-Canadian transborder forest research sites; solid waste removal problems in the Caribbean; the selection and management of marine protected areas in the Caribbean, and planning for a conference on opportunities and constraints for development in small islands.

U.S. MAB continued its strong support for, and involvement in, the development of the international network of biosphere reserves. The Biosphere Reserve Program is one of the hallmarks of the MAB concept and consists of identifying and conserving representative ecosystems throughout the world as benchmarks of environmental quality and centers for further research, demonstration and training.

In 1984, U.S. MAB supported: 1) research efforts on the effects of land use changes on conservation in a natural region containing biosphere reserves, 2) the development of a cartographic information system for the selection of biosphere reserves, 3) a review of the applications of remote sensing technology to the "Boundary Effects" model of biosphere reserves, and 4) a training workshop for managers of biosphere reserves and other protected areas.

In addition to increased program activities in 1984, the U.S. National Committee voted to reestablish a directorate on Urban Ecosystems and welcomed the establishment of an interagency agreement, under which the National Oceanographic and Atmospheric Administration (NOAA) will become a supporting member of U.S. MAB in FY 1985.

International Wildlife and Habitat Conservation

American support for conservation of wildlife and for U.S. leadership in preserving and protecting bioligical diversity and habitat continues to be broad and deep. Congress, successive Administrations, and a wide range of non-governmental organizations have responded to this national will with such major initiatives as the U.S. Endangered Species Act and the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). As a nation, the United States has undoubtedly done more than any other in recent years to protect its own wildlife and habitat as well as to foster and contribute to the conservation of wildlife resources at the international level. The federal government plus a large number of private organizations have been involved.

The U.S. Government has a variety of mechanisms available to pursue international wildlife conservation: domestic efforts enabling it to demonstrate and lead by example; bilateral collaboration and assistance, using agency-to-agency agreements and development assistance; our influence in an array of multilateral organizations, and the cooperation and support of the American private sector. All are valuable and reinforcing. Through this array of institutional mechanisms, the United States carries out a vigorous broad-based effort at the international level involving: research and monitoring, development and exchange of data and information, assistance to management of wildlife populations and habitat, implementation and enforcement of wildlife conservation treaties, conventions, bilateral agreements, and laws (both domestic and foreign), technical assistance, institution building through training and education, and direct financial support for foreign conservation via a range of collaborative mechanisms.

In November 1983, through the International Environmental Protection Act (PL 98-164), Congress directed the Secretaries of State and the Interior to review and report on existing U.S. international activities relating to the conservation of wildlife resources and to develop recommendations to improve existing capabilities. The same Act also required the Agency for International Devlopment (AID), in consultation with other agencies and departments, to formulate and report a U.S. strategy to conserve biological diversity in developing countries.

CITES, with nearly 90 State Parties, remains a focal point of international wildlife conservation. The United States continued to play a leading role in implementing and enforcing the Convention in 1984. A U.S. representative worked with the CITES Secretariat and members of the Standing Committee to devise a more effective and appropriate relationship between CITES, the United Nations Environment Program (UNEP), and the International Union for Conservation of Nature and Natural Resources (IUCN). In Tucson, Arizona in February/March 1984, the United States chaired the first meeting of the Plant Working Group of the CITES Technical Committee which called for more attention to the preservation of plant species endangered by trade. U.S. representatives attended meetings of the Standing and Technical Committees, and the U.S. Fish and Wildlife Service (FWS) provided professional instructors and materials for a seminar on implementation of the convention for Asian and Oceanian Parties, held in Kuala Lumpur, Malaysia, October 1984. In addition to such in-kind assistance and support, the 1984 U.S. contribution to the CITES Trust Fund for administration of the Secretariat and meetings was $150,000. FWS, the State Department and other agencies have begun preparations for U.S. participation in the fifth biennial Conference of Parties to be held in Buenos Aires in April/May 1985.

Among many other activities of U.S. development assistance and resource management agencies, the FWS conducts programs in Egypt, India, and Pakistan, utilizing U.S.-owned foreign currencies as authorized by the Endangered Species Act. Activities include training, species and habitat research, education and public awareness development, scientific symposia, and planning. The major 1984 initiative was support of India's new Wildlife Institute which trains Indian park and wildlife sanctuary managers and is expected to assume an important role in training wildlife biologists for the region. As head of India's Board of Wildlife, the late Prime Minister Gandhi gave strong support to wildlife conservation in India as well as to U.S. activities in this area. In addition to $300,000 worth of foreign currency equivalents disbursed in all three countries, one full-time FWS position was allocated to coordinate these activities at a cost of $41,000 plus $10,000 in administrative expenses.

Other important FWS international activities include implementation of the 1940 Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere, including regional cooperation in the management of migratory birds, control of trade in rare species, and protection of habitat. In 1984, the FWS initiated a regional training program for graduate study in wildlife biology in Costa Rica. This program will develop a trained cadre of wildlife biologists throughout Central America in line with the President's Caribbean Basin Initiative and with the support of governments in the region. The FY 1984 congressional appropriation for U.S. implementation of the Convention was $150,000, with 1.25 positions to coordinate activities at a cost of $43,000 per year.

Under the U.S.-USSR Environmental Agreement of 1972, cooperation involves a variety of activities and technical exchanges in the area of plant and wildlife conservation. The 1984 program was highlighted by a joint U.S./Soviet five-week research cruise to study limnology, aquatic biology and pollution problems in the Bering Sea. Twenty-six Soviet and 16 American scientists participated at a cost of approximately $2.5 million to the USSR, which supplied the ship for the cruise. The FWS provided approximately $270,000 in support of this effort, plus one position at $37,000 and $30,000 in support for the overall U.S.-USSR program. Wildlife-related activities under the Environmental Agreement remained a positive, mutually beneficial area of exchange between the United States and the Soviet Union in 1984.

International Park Activities

National Park Service (NPS) international activities involve over 50 separate projects in more than 25 countries. These include training, environmental interpretation, park design and establishment, and information dissemination. Projects are executed in collaboration with other U.S. agencies, foreign counterpart agencies, international institutions, and American and foreign non-governmental organizations. Most have a direct, immediate relationship to the conservation of international wildlife resources. Following are the main areas of activity carried out by NPS in 1984:

-- Ecological Research and Monitoring - NPS has assisted the design and implementation of applied research and monitoring of natural ecosystems as a basis for identifying conservation requirements and selecting strategies to maintain biological diversity. Countries involved include Spain, India, and the USSR (through the Man and the Biosphere Program). Resources invested: NPS--$17,000, other USG--$269,410; foreign--$239,000.

-- Protected Area Planning, Design and Management - NPS exchanged technology, practical experience, and approaches to area and resource management for its own benefit and that of other nations through information transfer, training, scientific exchanges and technical consultancies (where non-NPS funding is available). Programs have been active in India, Spain, Saudi Arabia and Western Hemisphere countries. Funding: NPS--$10,500; other USG--$72,000; foreign--$11,512,702.

-- Public Awareness/Conservation Education - NPS experience and expertise in these areas is recognized worldwide. Active programs include India, Spain, Japan, Sri Lanka and Western Hemisphere countries. Funding: NPS--$29,000; other USG--$60,000; foreign--$318,400.

-- Archeological and Historical Site Preservation and Related Research - NPA maintained ongoing exchanges of technology in this field with Spain and China under formal agreements and responded to requests for assistance from other governments and international organizations. Over 40 nations participated in the First World Conference on Cultural Parks organized by NPS at Mesa Verde National Park. funding: USG--$40,000; foreign--$130,000.

-- World Heritage Convention - As lead agency for the United States, NPS coordinated U.S. participation in the World Heritage program in identifying, recognizing and protecting natural sites and cultural properties of outstanding international significance. The Service has provided technical assistnace to most of the 82 nations which participate in the program. Resources: USG--$15,000; foreign--$700,000

-- Training/Information Exchange - NPS maintains active information exchanges with foreign governments and international organizations and provides opportunities for training. In 1983-84, 5,954 training days were provided to foreign professionals and technical personnel from 83 nations. The Service generates, synthesizes and disseminates technical information on natural resources conservation and management to AID mission personnel and host countries under a contract with AID now in its fifth year, and through an agreement with AID, is designing and implementing training programs in coastal zone, rangeland and humid tropic management. The Service is also a principal supporter of Parks magazine, the international technical journal for park management. Resources: NPS--$39,000; other USG--$572,000; Foreign--$1,301,000.

The United States and the nations with which it cooperates derive substantial benefits from all these NPS activities and programs. Less developed countries are made aware of natural resource concerns and encouraged to plan for sustainable economic growth. Our Government is seen as visibly responsive to identified priorities of requesting governments in conserving their national heritage. The United States and its partners in exchange of information and technology gain, both with respect to the knowledge and techniques acquired and in developing greater mutual understanding of common global conservation issues.

International Activities of the U.S. Geological Survey

The U.S. Geological Survey (USGS) has conducted international activities as an extension of its domestic programs since 1940. Authority for foreign participation derives from the revised USGS Organic Act, the Foreign Assistance Act, and related legislation. Principal objectives of the USGS international activities are:

-To help achieve domestic research objectives through the comparative study of scientific phenomena abroad and in the United States.

-To obtain information about existing and potential foreign resources of interest to the United States.

-To develop and maintain contacts with counterpart institutions and programs to facilitate scientific cooperation and exchange.

-To provide support for the international programs of other federal agencies, including those of the Department of State, which contribute toward foreign policy objectives.

Major Programs and Activities

USGS international programs are usually of two general types:

1) Technical assistance to other countries and international organizations utilizing funds from other federal agencies, from international organizations, or from foreign governments as authorized under the Foreign Assistance Act and related legislation.

2) Scientific cooperation with foreign counterpart organizations, bilaterally or multilaterally, under government-approved cooperative agreements to achieve common research objectives, utilizing both funds appropriated for Survey research and funds or other financial resources made available by the cooperating countries or organizations.

Many related activities that form integral parts of the programs commonly stem from international work -- for example, institutional development, exchange of scientists, training of foreign nationals, and representation of the Survey or the U.S. Government in international organizations, commissions or associations.

Training

During 1984, the Survey conducted four formal training courses for 83 foreign nationals, including remote sensing workshops and courses in techniques of hydrologic investigations and geologic and hydrologic hazards. In addition to scheduled training courses, the Survey provided or arranged for on-the-job or academic training for 167 people, either at USGS facilities or at other organizations on behalf of the Survey. The 250 trainees (including those in the formal courses) represented 55 countries; 66 were from Saudi Arabia. The Survey also continued to arrange programs for visiting scientists. Through these programs, 106 scientists from 25 countries conducted cooperative research at the Survey or USGS-selected institutions; 25 were from the People's Republic of China.

Caribbean/Latin America

During 1984, the Survey developed a program supportive of the U.S. Caribbean Basin Initiative, involving cooperative scientific research with counterpart agencies in Caribbean nations to enhance their economic well-being and improve the health and safety of the populace. The proposals are largely extensions of domestic studies such as the Strategic and Critical Minerals Program, the Geologic Framework and Synthesis Program, and the Earthquake Hazards Reduction Program. USGS scientists have briefed officials of the Department of the Interior, Department of State and U.S. Agency for International Development (AID) throughout the year to acquaint them with the resource and geologic hazards potential of the region, including earthquakes, landslides and volcanic eruptions, and to outline the Survey's proposals for study.

Other USGS Caribbean/Latin American programs included: (1) a workshop and follow-up on the potential for discovery of phosphate deposits providing an accessible local source of agricultural fertilizer, an important step toward mitigating the region's severe food problem, (2) technical assistance to Costa Rica in coal resources assessment and exploration to help reduce dependency on imported oil and replace fuelwood, thus alleviating deforestation, (3) a geologic synthesis and mineral resource assessment of Colombia with follow-up and related activities, (4) cooperative research in Mexico, and (5) technical assistance and institutional development in Peru.

Asia and the Pacific

The Survey's research vessel, S.P. Lee, completed a resource appraisal cruise in the southwest Pacific in 1984 as part of "Operation Deep Sweep," a pole-to-pole expedition designed to obtain data to further the knowledge of tectonic processes and the resource potential of the Pacific Basin. The project is a continuation of the Australia-New Zealand-United States Tripartite Geoscientific Resource Investigation into the southwest Pacific under the direction of the Committee for Coordination of Joint Prospecting for Mineral Resources (CCOP). The investigation was successful in delineating structural and stratigraphic features that may be promising mineral or energy resource targets.

In the Asia-Pacific region, the USGS also: (1) conducted a 6-month pilot survey to analyze tertiary sedimentary basins in the offshore areas of Sarawak, Sabah, Brunei, Kalimantan (Indonesia) and the southwestern Philippines as a forerunner to a planned program in basin analysis of the East Asia Region, in cooperation with the International Union of Geological Sciences and the CCOP, (2) continued cartographic compilation of materials submitted by geoscientists from as many as 35 countries in the Circum-Pacific Map Project, and 3) conducted a variety of geologic and mineral resources projects under the Earth Sciences Protocol with the Chinese Ministry of Geology and Mineral Resources.

Middle East and Africa

The Survey completed its program of systematic mapping of the Arabian shield and is preparing LANDSAT image maps for use by the Saudi Arabian Ministries of Agriculture and Petroleum and Mineral Resources. Through a long-term program of technical assistance, USGS is equipping and training personnel of the Jordanian Water Authority in methods to evaluate hydrologic systems in North Jordan, with emphasis on ground water. It is also cooperating with the Natural Resources Authority in the establishment of a micro-earthquake network for Jordan.

In Africa, the Survey: (1) trained Tunisian scientists in remote sensing and helped organize and equip a unit in the Soil Division of the Ministry of Agriculture, (2) proceeded on a four-year program related to the anticipated development of the Senegal River Basin which will affect Senegal, Mauritania and Mali, and (3) at the request of the State Department, conducted post-earthquake damage assessment and analysis of seismologic data in Guinea, using disaster funds.

Cooperative projects and exchanges relating to the Pacific, Red Sea, Antarctica, Hungary, the Azores, Spain and Yugoslavia were conducted with a number of European countries.

Other Department of Interior Activities

The Bureau of Mines has cooperative agreements with Australia, Brazil, Canada, the Federal Republic of Germany, France, the Republic of Korea, Poland, the United Kingdom, Yugoslavia and the European Communities. In 1984, cooperative activities were continued under all these agreements except with Poland; the agreement with Israel expired and was not renewed. These foreign programs are extensions of domestic research programs and do not require additional Bureau funds, except for foreign travel and manpower costs for receiving visitors, at a total of $285,000 for 1984.

Cooperative activities have concentrated on health and safety research with Western European countries to improve the mining environment, with Canada because of common interests, with Korea to provide technical assistance, and with Australia, Poland and Yugoslavia for technical exchanges. The Bureau and the USGS exchange data with counterpart organizations of Australia, Canada, the United Kingdom, the Federal Republic of Germany, and South Africa under the International Strategic Minerals Inventory. In addition, the Bureau has provided opportunities for residential training and mining research for visiting Chinese scholars and researchers.

The Bureau of Land Management developed training packages and arranged training and orientation for some 26 foreign nationals from eight developing nations without any financial burden to the Bureau. Tangible benefits from BLM's involvement were mainly to the assisted countries, while U.S. interests in international exchange were served.

The Bureau of Reclamation's international activities are largely: (1) reimbursable technical assistance programs, (2) science and technology cooperative agreements, and (3) training programs for foreign nationals in water resource development or related activities, either in the U.S. or in their country.

Advisory assistance was provided by Reclamation to foreign governments in 1) China, with the planning, design, and construction of the Three Gorges Dam and Powerplant, 2) Egypt, on the Aswan High Dam Power System Rehabilitation and Modernization, 3) Ecuador, on irrigation systems repair and rehabilitation, 4) Malaysia, with construction supervision of Batu Dam, 5) Morocco, with a winter snowpack augmentation project, 6) Pakistan, with design and construction supervision

on the Drainage IV Project, 7) Saudi Arabia, with advisory assistance in developing a research and training center in desalination, 8) Somalia, involving an investigation of irrigation potential in the Juba River Basin, 9) Sudan, with the preparation of a water and power development program, and 10) Zaire, with the operation and maintenance of the 500KV Inga-Shaba Transmission Line and System. Reclamation also participated in cooperative science and technology programs with Spain and Israel.

Global Climate Impact Assessment

The National Oceanic and Atmospheric Administration has developed a reliable and cost-effective program to support drought/disaster early warning and technical assistance objectives of AIDs Office of Foreign Disaster Assistance. Since 1979, AISC has issued biweekly assessments of climatic impact on food security for developing countries in the Caribbean Basin, Africa, South and Southeast Asia, and more recently, Central America and the Andean countries of South America. Studies have shown that climate impact assessments can give a one to three month lead time to decision makers, planners and economists for planning food assistance strategies and measures to mitigate potential socio-economic disruption. Because of the reliability and value of these assessments, AISC also has worked with AID to help developing countries implement their own national operational assessment programs, workshops and seminars, followed by in-country technical assistance missions.

Total USG funding of the assessment program since 1978 is approximately $4 million. Approximately $1.3 of this has been devoted to technical training; the remainder to development and distribution of climatic impact assessments. Foreign country investments involve designation of technical and policy-level personnel to participate in seminars and training programs, as well as the collection and provision of local ground truth information. In addition, upon completion of the technical assistance program, each country will modify its ongoing climate assessment programs to incorporate the new methodologies and techniques from this project.

In the Asia/Pacific region, short term, U.S.-based training was provided during FY 84 to agrometeorologists who developed assessment models for pilot study areas in their countries. Workshops were held for decision makers and technicians from national ministries of agriculture and meteorological departments, followed by policy-level evaluation seminars and advanced technical review and assistance. Some participating countries are already successfully using the methodology. For example, the Philippines Agriculture Ministry has extended the assessments from the pilot study area to the national level.

The humanitarian benefits are both immediate and long term. Drought monitoring and crop condition assessments contribute directly to food security programs and can also supplement existing crop production forecast systems. Resulting improved policy and food security management decisions at the national and international levels can lead to the mitigation of regional food shortages if timely and open information is available to develop appropriate strategies.

Economic benefits are felt within the impacted region and beyond. The AISC assessment technology can provide potentially affected countries with early warning of impending problems and promote the maintenance of economic and social stability. Besides political benefits for the U.S., these programs provide a real test case to demonstrate new techniques and improve our understanding of a variety of climate situations. In addition, the locally collected ground truth data is a significant asset in the development and refinement of global and regional agroclimatic models.

It is anticipated that each country involved in AISC/AID projects will develop its own climate impact assessment system using the techniques provided through these activities. The ultimate result will be improved understanding and management of global food supplies and increased food security.

Population

International Policy and Programs

Over the past 20 years, the United States has played a leading role in focusing attention on population issues, in urging international cooperation, and in the design and implementation of population strategies based on voluntary family planning. U.S. population policy is guided by principles of voluntarism, freedom of choice, and sensitivity to human and cultural values.

The Office of the Coordinator for Population Affairs in the Department of State has responsibility for coordinating U.S. international population policy aimed at enhancing the effectiveness of U.S. programs, the programs of other nations, and the activities of international organizations in this area. U.S. international population assistance programs are implemented by the Agency for International Development (AID). Cooperation between the Department of State and AID is close and continuous.

An important addition to U.S. population policy occurred on July 13, 1984, when the White House issued a statement on international population policy preparatory to the International Conference on Population in Mexico City (August 6-14). This statement was further amplified in Mexico City by Ambassador James Buckley who led the U.S. delegation. The new statement reiterates continued strong U.S. support for voluntary international family planning programs in developing countries; integrates U.S. population and economic development policies into a comprehensive strategy stressing the critical role economic development plays in achieving population goals, and prohibits U.S. support for coercion or abortion in family planning programs.

The new policy tightens existing restrictions on U.S. funding of abortion in three areas:

1. When dealing with nations which support abortion with funds not provided by the U.S. Government, the U.S. will contribute to such nations through segregated accounts which cannot be used for abortion.

2. The U.S. will no longer contribute to separate nongovernmental organizations which perform or actively promote abortion as a method of family planning in other nations.

3. The U.S. will insist that no part of its contribution to the UN Fund for Population Activities be used for abortion. The U.S. will also call for concrete assurances that the UNPFA is not engaged in, nor provides funding for, abortion or coercive family planning programs, and if such assurances are not forthcoming, the U.S. will redirect the amount of its contribution to other, non-UNFPA, family planning programs.

Resources Invested In International Population Activities

In FY 1984, the U.S. provided $240 million for population assistance programs, 44 percent of the total amount contributed by developed countries. Other donors, led by Japan, have pledged to increase the level of their assistance in coming years. The developing countries provide about half or approximately $500 million of the total resources for population programs.

International Consensus on Population Issues

In August 1984, the United Nations International Conference on Population (ICP) was held in Mexico City. Representatives from 146 countries met to discuss ways to improve and implement

the World Population Plan of Action agreed upon at the 1974 World Population Conference in Bucharest. In unity of outlook and goals, the ICP differed dramatically from the 1974 conference. In Bucharest, many developing nations questioned the need for population programs, arguing that only a redistribution of wealth and greater economic growth would solve their development problems. The ICP, convened at the urging of many developing nations, took as a universal theme the importance of both population and economic development policies in improving the quality of life of the world's inhabitants.

Delegations exchanged considerable information regarding family planning programs and agreed to 88 recommendations for further private and public action to reach the goals of the World Plan of Action. The 23-point Mexico City Declaration on Population and Development, which was approved unanimously, focused on specific priority actions to be taken in the years ahead.

The World Bank on Population

The World Bank's annual World Development Report 1984 examines population growth in relation to resources. The report states that in the poorest countries, rapid population growth greatly impedes economic development. The report calls for greater international commitment to population programs and a substantial increase in population assistance. To this end, World Bank President A. W. Clausen pledged that the Bank will double loans for population assistance and related health projects over the next few years. These loans will be concentrated in sub-Saharan Africa and South Asia--today's poorest countries with the fastest population growth.

The ICP, the World Bank Report, and the Bank's promise to increase dramatically its population lending were the most recent demonstrations of the widespread consensus, both in the developed and developing world, on the need for voluntary family planning programs.

The U.S. Role in Consensus Building

In FY 1984, the Office of the Coordinator of Population Affairs participated in international conferences and met with cabinet and subcabinet officials of developed and developing countries, the heads of the World Bank and the United Nations Fund for Population Activities, Vatican representatives, and with population program officials, scholars and leaders of private organizations.

In preparation for the Mexico City Conference, the U.S participated in the Second African Population Conference (Arusha, Tanzania, January 1984), in the Third Regional Population Conference (Amman, Jordan, March 1984), and in the DAC Preparatory Meeting (Paris, France, June 1984). The African conference is particularly noteworthy because of the dramatic shift displayed in African views on population programs. The "Kilimanjaro Programme of Action for African Population and Self-Reliant Development" recognizes the stresses and strains which rapid population growth can impose on development efforts and directs that, "Governments should ensure the availability and accessibility of family planning services to all couples or individuals seeking such services."

The U.S. also participated in the two ICP Preparatory Committee meetings at the UN in January and March which had the important task of drafting documents to be sent to Mexico City. The U.S. worked to remove extraneous and duplicative language and to focus the documents on the priority actions that need to be taken in the years ahead. The U.S. also added, among many others, recommendations on natural family planning and the need for research into safer and more effective family planning methods.

At the Mexico City Conference, the U.S. delegation, guided by the new U.S. international population policy statement, emphasized past successes in development efforts, pointed to the record of free market economies in aiding development, and stressed the role of the private sector in population and development programs. The U.S. took the lead in opposing the introduction of extraneous and divisive political issues into the conference. The U.S. delegation also repeatedly stressed the importance of voluntarism in family planning and stated that the U.S. does not consider abortion an acceptable element of family planning programs. U.S. statements and amendments resulted in documents that are more balanced and more sensitive to social, cultural, and religous values.

Implications for the Future and Foreign Policy Benefits

International efforts on population programs have been among the most successful examples of international cooperation. Total fertility rates have fallen, human life expectancy has increased, caloric intake per capita has improved, literacy rates have increased, disease has diminished and health care improved, and per capita income has grown. While trends have proceeded in a positive manner, there has been little reduction in population growth rates in a number of countries and the absolute number of people in need of voluntary family planning is still very great. In the ten years since the last World

Population Conference, some 770 million more people inhabit the earth, 90 percent of whom reside in developing countries. Annual increments to the world population continue to grow, currently 80 million annually. The total world population is expected to increase from today's 4.8 billion to 6.1 billion by the year 2000.

Against this demographic background, it is fitting that the world's nations met at the International Conference on Population to review progress in population programs and chart new paths for future actions. The World Population Plan of Action has provided a solid foundation for cooperation in this field, and the work at Mexico City further strengthened international consensus on the interrelationships between economic development and population.

The primary U.S. objective will be to continue encouraging developing countries to adopt sound economic and population policies consistent with respect for human dignity and family, religious, and cultural values. As President Reagan stated in his message to the conference:

> "...such programs can make an important contribution to economic and social development, to the health of mothers and children, and to the stability of the family and of society."

Population assistance is an ingredient of a comprehensive program that focuses on the root causes of development failures. The U.S. program as a whole, including population assistance, lays the basis for well-grounded, step-by-step initiatives to improve the well-being of people in developing countries and to make their own efforts, particularly through expanded private sector initiatives, a key building block of development programs.

The long-standing commitment of the U.S. to population assistance continues. In FY 1985, the U.S. will provide $290 million for population programs, $50 million above the FY 1984 figure and a record high level for this effort.

CHAPTER 9 - HEALTH

Scope and Description of Cooperation

International cooperation in the health sciences has long been recognized as an important element in helping to achieve diplomatic goals, in addition to being an essential mechanism for achieving the domestic and international health objectives of the United States. Because health is a fundamental and universal concern of all nations -- disease and illness do not honor national boundaries and many health problems exceed the capacity of any one country to resolve -- international health cooperation has helped build better understanding among nations. Moreover, U.S. excellence and leadership in the health field adds to our national stature in the world community.

For over four decades, the U.S. Government's international health involvement has expanded and evolved to a level where it plays an important role in our diplomatic efforts. A significant number of federal agencies are engaged in health and health-related activities internationally. These include the Department of Health and Human Services (HHS), the Agency for International Development (AID), the Department of Agriculture (USDA), the Peace Corps, the Department of Commerce, the Department of Defense, the Department of Education, the Department of Labor, the Department of State, the Department of Transportation, the Environmental Protection Agency, the National Science Foundation, and the Drug Enforcement Administration.

Because the Department of Health and Human Services (HHS) is the principal health science agency of the U.S. Government, this chapter deals primarily with the programs and activities carried out by HHS, and, in particular, by the Public Health Service (PHS). (Health-related international programs of USDA and AID are reviewed in Chapters 5 and 14, respectively.) It should also be noted, however, that the Department of State, including its U.S. Embassies overseas, plays a prominent and key role in the field of international health by facilitating contacts between U.S. public and private sector institutions and their foreign counterparts, by collecting and exchanging information and data at the international level, and by assisting with the negotiation and implementation of cooperative health agreements. Under a Memorandum of Understanding with HHS, the State Department expedites telegraphic communications, travel arrangements and proposal reviews in support of the extensive overseas responsibilities and interests of HHS agencies. In 1984, a new Electronic Mail system was established between the two departments to upgrade speed and efficiency.

Within HHS, the principal component engaged in international health is the Public Health Service, consisting of five agencies -- the Alcohol, Drug Abuse and Mental Health Administration; Centers for Disease Control; Food and Drug Administration; Health Resources and Services Administration; and National Institutes of Health -- as well as the National Center for Health Statistics and the National Center for Health Services Research, which are part of the Office of the Assistant Secretary for Health. Collectively these agencies cooperated in 1984 with over 80 countries in every region of the globe.

The PHS international programs are carried out through a variety of mechanisms, including the award of grants and contracts to foreign institutions in connection with the domestic research programs of the PHS, principally the biomedical research programs of the National Institutes of Health; the visiting scientist programs throughout the PHS, under which there are nearly 3,000 foreign participants each year, and cooperative activities under bilateral agreements, including 26 bilateral health agreements as well as several umbrella Science and Technology Agreements. PHS experts and scientists participate in scientific meetings throughout the world, and the PHS Agencies sponsor meetings, both domestic and international, on health issues of international importance. Additionally, the PHS Agencies cooperate closely with AID under approximately 20 PHS-AID agreements.

Participation in multilateral organizations, mainly the World Health Organization (WHO), the Pan American Health Organization (PAHO), the International Agency for Research on Cancer (IARC), the United Nations Commission on Narcotic Drugs, the Food and Agriculture Organization (FAO), and the United Nations Children's Fund (UNICEF), continues to play an important role in HHS' international efforts. By virtue of authority delegated to it by the Department of State under the Mutual Security Act, HHS, through its Public Health Service, serves as the principal Government liaison with the WHO, PAHO, and IARC on all technical matters, with the Department of State maintaining its responsiblities for foreign policy, fiscal, and legal issues. The two Departments work closely and cooperatively on all issues that come before those international organizations in which they both are involved.

The governing body and other meetings of WHO, PAHO and UNICEF provide important opportunities for U.S. health officials to discuss, in relatively neutral settings, matters of mutual interest with ranking health officials of other governments. Often, these discussions include ways of improving programs of cooperation in the health sciences, both bilaterally and multilaterally.

During 1984, the United States continued its cooperation and active participation in the work of WHO, including such important programs as those on essential drugs, tropical disease research, diarrheal diseases, alcoholism, the Expanded Program on Immunization, and others.

Bilateral Activities

Diplomatic considerations often play an important role in the bilateral health programs, particularly in regard to decisions to sign formal agreements and decisions to increase, and sometimes decrease, emphasis on a relationship with a particular country or set of countries. While providing important opportunities for technical and scientific advancement, many existing bilateral health programs and agreements were in part responsive to diplomatic initiatives. These include the creation of the U.S.-Japan Cooperative Medical Science Program, the U.S.- USSR Health and Artificial Heart Agreements, the U.S.-Egypt Health Agreement, the U.S.-Nigeria Health Agreement, the U.S.- People's Republic of China Health Protocol, and, most recently, the U.S.-India S & T Initiative, under which there is a significant health component.

In general, these agreements and programs have been built on a foundation laid through years of scientific interchange, including, in some instances, collaborative research. The importance of health and the general apolitical nature of the cooperation have been underlined by several cases in which the program in health has continued with certain countries during periods of strained diplomatic relations and, in at least one instance, when formal diplomatic relations had been suspended. Thus, relationships with influential scientists and health science administrators (many of them governmental) have been sustained and helped provide a firmer groundwork for future dialogue and the basis for the formal agreements (S & T and/or health) which were ultimately signed.

Examples of bilateral activities that enhance U.S. foreign policy objectives include the following:

-- People's Republic of China - Cooperation in health continued in 1984 under the Health Protocol and several other agreements between agencies of the PHS and counterpart Chinese institutions. An understanding was reached with the Chinese to extend the Health Protocol for an additional five-year term (through June 1989). Under the Health Protocol, cooperative research and exchanges are taking place in ten scientific areas, including infectious and parasitic diseases, cancer, cardiovascular diseases, immunology and mental health. In the cardiovascular disease area, for example, a long-term epidemiological

study is under way. Data from the Chinese study will be compared with data on the U.S. population, thus enabling unique comparisons between two countries that differ vastly in cultural, socio-demographic, genetic, dietary and other lifestyle characteristics. Several joint publications in the international literature have already resulted from this collaboration.

-- In 1984, a new agreement (separate from the Health Protocol) was developed between the PHS Centers for Disease Control and the newly formed Chinese National Center for Preventive Medicine. This agreement will enable expanded cooperation related to epidemiology/surveillance of diseases.

-- Egypt - Cooperation with Egypt continued in 1984 on a number of projects, including the bilharziasis research and control program at Qalyub, the diarrheal disease project at the Epidemiology Study Center in Bilbeis, a study of the epidemiology of pertussis and H. influenza, a long-standing study of the ecology of trachoma and other eye infections, and studies of the epidemiology, immunological and clinical aspects of lymphomas and leukemia, to name only a few. Agreement was reached with AID to provide funding for 21 ongoing research projects in which the PHS Agencies are involved.

An important trilateral project (Egypt, Israel and the U.S.) for study of the epidemiology of three arthropod-borne diseases (Rift Valley fever, malaria and Leishmaniasis) in Egypt and Israel continued. This project is being carried out by the National Institute of Allergy and Infectious Diseases, NIH, in cooperation with Ain Shams University in Egypt and Hebrew University in Israel. Funding for this project, now in its third year, is provided by AID.

-- India - Cooperation with India was expanded substantially under the Indo-U.S. Science and Technology Initiative. This Initiative was agreed by President Reagan and the late Prime Minister Gandhi, during the latter's 1982 visit to the United States. In January 1984, following a series of planning meetings, the PHS signed 23 new research project agreements for cooperation with Indian institutions. These projects focus on leprosy, tuberculosis, filariasis, malaria, prevention of blindness, and reproductive physiology, both fertility and infertility. Emphasis in the infectious disease and reproductive physiology areas is on immunological

approaches to these problems. Work continued on approximately 25 projects financed under the PHS Special Foreign Currency Program. These ranged from fundamental studies in molecular biology to field studies of iron deficiency anemia.

-- Israel - Cooperation with Israel under the U.S.-Israel Health Agreement continued in 1984. Plans were developed for a joint workshop to be held in 1985 on technology assessment and implications for health policy. In October 1983, the National Institutes of Health signed, with the Israeli Ministry of Health, a plan of action for cooperation in biomedical research. Potentials for cooperation on cancer, heart disease, aging and child development and human reproduction are being explored.

-- Japan - Cooperation under several agreements with Japan continued during 1984. These included the U.S.-Japan Cooperative Medical Science Program, which focuses on health issues of special concern to Asian countries, the programs on vision and cancer research, cooperation on alcoholism and mental health, food and drug issues, and health statistics. An agreement between the National Institute on Aging, NIH, and Japan's Institute of Gerontology was signed in 1984. This agreement provides the basis for a program focused on a major concern of both countries -- the "graying" of the population and the important health issues in this regard.

-- Korea - PHS participated in the February 1984 U.S.-Korea S & T Meeting in Seoul. Interest was expressed by the Koreans for cooperation in the area of toxicology. Agreement has been reached that the National Center for Toxicological Research (NCTR), a component of the Food and Drug Administration, and the National Institute of Environmental Health Sciences (NIEHS), a component of NIH, would accept Korean scientists for postdoctoral training. PHS will provide training facilities and Korea will pay expenses of their trainees.

-- Mexico - Following up on the December 1983 Working Group on Health and Social Services of the U.S.-Mexico Mixed Commission, steps were taken to initiate collaboration in the areas of neurochemistry of affective disorders, maternal and child health, including protein-energy malnutrition and weaning and acute respiratory infections, training in repair and maintenance of biomedical research instrumentation, and selected infectious diseases. The 1983 meeting was the first time that the health field had been included in discussions of the Mixed Commission.

-- Poland - While official exchanges with Poland under the Marie Skladowska Curie Joint Fund for S & T cooperation, ceased during 1984, selected exchanges in the health sciences took place through other arrangements. Of particular note was the U.S.-Poland Symposium on Cardiovascular Disease held in Poland in June 1984. Eight U.S. scientists, seven of whom are affiliated with U.S. universities and non-governmental medical institutions, participated in this Symposium. At this meeting it was agreed that joint activities should be continued on three projects in the area of Ischemic Heart Disease.

-- USSR - Cooperation with the Soviet Union continued at the working level under the Health and Artificial Heart Agreements, despite the absence of high-level meetings. In the cardiovascular disease area, important information on risk factors is being gathered through joint research, and significant differences have been identified between the populations studied in the United States and the USSR. In addition, a joint clinical study of two different types of treatment for patients suffering from advanced coronary heart disease should yield valuable data on the relative efficacy of differing treatment approaches. In the cancer research area, there is a sharing of information and data on anti-cancer drugs and preclinical compounds that would not otherwise be available to the United States. In environmental health, collaboration focuses on biological effects of non-ionizing radiation. Eye disease research includes study of treatment for retinitis pigmentosa, use of lasers in the treatment of anterior segment disease, and assessment of optic nerve function, ocular hypertension and glaucoma. The pace of collaboration in influenza and viral hepatitis has increased in recent months and includes topics such as the appropriate use of various vaccines and drugs for the treatment of influenza, as well as the exchange of scientists working on hepatitis.

An important ongoing effort of the PHS Agencies is the exchange of information and study of important international issues through specialized meetings. During 1984, the Fogarty International Center continued a series of meetings to consider disease candidates for improved control and potential eradication. Two conferences in this series, held in 1984, addressed yaws and other endemic treponematoses and prevention of congenital rubella infection. The National Center for Health Statistics convened a meeting, involving participants from 23 countries, to examine issues related to low birth weight and infant mortality.

Efforts were made throughout the year, using a variety of mechanisms, to exchange information on a new health threat --acquired immune deficiency syndrome (AIDS). There have been over 8,000 known cases of this disease worldwide, with over 50 percent resulting in death. The PHS will hold an international conference on AIDS in April 1985.

Program Review and Evaluation

All international activities of the Public Health Service are approved for support based on their potential for benefit to the United States and, in the case of the bilateral programs, for their benefit to our partner countries as well.

It is important to note that all research awards, funded with dollars or U.S.-owned foreign currencies, are reviewed for scientific excellence in accordance with existing laws and regulations of the U.S. Government. Awards by the PHS cannot be made on the basis of diplomatic considerations alone. Proposals for research support are reviewed, as applicable, for protection of human subjects.

As noted above, the PHS bilateral programs have, historically, been the principal mechanism by which HHS responds to diplomatic initiatives. Generally, when the Department of State advises HHS of plans to strengthen scientific and technological cooperation with a particular country or set of countries, steps are taken within HHS to: (1) inventory existing activities with the country or countries concerned, (2) assess potential for productive future cooperation, based on information regarding health research capabilities in the other country, prevalence of health problems, and stated interests of the other country, and (3) assess the availability of resources to support the cooperation. A determination is also made regarding whether the proposed cooperation would involve intramural programs and researchers of the PHS, grantees of the PHS, other non-governmental organizations, or all of the foregoing. If common interests are found with the other country, if there is potential for benefit to both countries, and if resources are available, a general framework is developed for the relationship, including specification of areas of emphasis, mechanisms for cooperation, and principles for funding. Within that framework, individual projects and activities are carried out.

Program reviews of international activities are carried out within the context of each participating PHS agency's program review system and, in the case of bilateral agreements, in connection with the renewal of the agreements. From time to time, evaluations of specific international programs or

activities are conducted. For example, in 1984, an evaluation of the individual scientist exchange program under the U.S.-USSR Health Agreement was initiated. The objective of this evaluation is not only to review the accomplishments under this program, but to identify ways of improving the program in the future, both substantively and administratively.

Resources in Support of International Health Cooperation

During FY 1984, approximately $33 million was obligated for international research project support, including $6 million in U.S.-armed foreign currencies; $22 million was spent for scientist exchanges, and $10 million was spent on other international program support by the PHS Agencies. Approximately 50 percent of the money devoted to international programs was spent in the United States, with a major portion for support of visiting scientists engaged in research and related activities, largely at NIH, and for bilateral exchanges under the several formal bilateral health exchange programs.

Funds have been available from non-PHS sources to support selected bilateral PHS activities. In FY Year 1984 funds were available through the U.S.-Yugoslav Fund for Scientific and Technological Cooperation, through the National Science Foundation for selected start-up costs in connection with the U.S.-India S & T Initiative, and through the U.S.-Spain science program under the Treaty of Friendship and Cooperation. These resources have been critical elements in sustaining an existing program (Yugoslavia), launching an expanded program (India), and beginning a new program (Spain) of bilateral activities.

Approximately $3.5 million from foreign assistance appropriations was expended under PHS agreements with the Agency for International Development.

Information is not available on expenditures by other countries for cooperation with the United States in the health sciences. It is believed that the level of support provided by many countries is similar to our own. This is particularly true where there are provisions in formalized agreements for each side to bear its own costs and in which reciprocal arrangements have been made for bilateral exchanges of scientists. It is noteworthy that in recent years several foreign governments have begun to provide funds to support work, particularly in the biomedical sciences, by U.S. scientists in their countries. These countries include Japan, the Federal Republic of Germany, Italy, Switzerland, Ireland, and India. This trend toward greater reciprocity in financing is a healthy one, which reflects the importance these countries place on collaboration with the United States.

CHAPTER 10 - OCEANS AND POLAR AFFAIRS

International Cooperation in Marine Science

Exclusive Economic Zone (EEZ) Access

1984 was a very good year for American marine scientists both in terms of access to the global ocean and in terms of mutually beneficial cooperative research. This was the first full year of implementation of the President's policy recognizing coastal nation jurisdiction over marine scientific research within 200-mile exclusive economic zones (EEZ). Access to waters off foreign coasts is important because many significant ocean processes under investigation by American marine scientists frequently occur within 200 miles of the coast, particularly those dealing with pollution and fisheries. Such processes do not respect oceanic divisions devised by mankind for ocean management and use. The former U.S. policy of not recognizing foreign claims to extended jurisdiction over marine science had made it difficult for American scientists to investigate phenomenon in important areas off many coastal nations. Now requests can be processed based on the necessary scientific elements of the project. This appears to have produced a more favorable climate for granting clearances.

Another positive change has been the steady determination of U.S. marine scientists to cooperate actively with scientists of coastal nations in research projects. Such cooperation continues to be carried out through a variety of bilateral and multilateral mechanisms, including specific bilateral agreements on marine science or on science and technology generally, and cooperative programs sponsored by a number of international organizations. These cooperative endeavors provide hard evidence of the goodwill of the U.S. and emphasize mutual benefits of marine research for all coastal nations. At the same time, such cooperative activities contribute to building marine science infrastructure, particularly in developing countries. This allows these countries to conserve, manage, and develop better their own marine resources. It also gives American scientists access to data attained by foreign nations which otherwise might not be available. The rational development of marine resources by developing countries contributes to their economic well being, the easing of North-South tensions generally, and provides a better setting for access by American researchers.

In short, 1984 saw a significant improvement in access for U.S. research vessels. The research vessel clearance program is carried out with the modest investment of one full-time

professional in the Department of State and part-time efforts of several others. These efforts facilitate vessel operations and scientific programs which run into the hundred of millions of dollars for U.S. technical agencies and research institutions.

Concurrently, the United States continued to demonstrate the effectiveness of its policy which promotes maximum freedom of marine scientific research by not asserting jurisdiction over research within its own EEZ. No ill effects have been recorded on U.S. resource and scientific interests in our EEZ from this policy; on the contrary, the U.S. has benefitted from the increased availability of data produced by foreign scientists operating within U.S. waters, working either on their own or in cooperation with U.S. researchers.

Bilateral Programs

Marine scientific research is an important element in many bilateral S&T programs (See also Chapter 4, Bilateral S&T Programs). For example, in the China program, the most important current activity is the study of ocean heat transport and the effects on climate variability. One of the prominent joint research activities with France has been in the field of oceanic geology, culminating in a successful scientific workshop, June 1984, in Brest, France. A joint research expedition to study sulfide mineralization and the accompanying biological communities associated with the active hydrothermal vents on the East Pacific rise was carried out in the spring of 1984 utilizing French and American submersibles, with analysis of the collected data continuing. The U.S.-Japan Cooperative Program in Natural Resources (UJNR) embraces a number of important projects in the marine area, including diving physiology. A 1984 experimental dive, the first since 1975, produced significant results regarding cardio-vascular parameters affected by long exposure to deep depths. Progress from that cooperative dive off Japan was so substantial that another 1,000-foot dive is being planned off the U.S. coast in 1985. Another significant 1984 UJNR project was the successful cooperative testing of a model hydrologic seabed mining system designed to prevent surface turbidity plumes, a subject of great environmental concern. In addition, fisheries and aquaculture proposals are now being considered under the Mexican bilateral agreement. Monsoon research is being conducted cooperatively with India, marine geological research with Pakistan, and the regional tide guage network is being expanded in cooperation with both. Participation in such cooperative marine science programs produces a number of benefits for both the United States and the other participating countries.

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Multilateral Programs

The U.S. continued to be an active participant in and beneficiary of a number of international organizations which sponsor or conduct marine scientific research programs, including the International Council for the Exploration of the Seas (ICES), the Inter-American Tropical Tuna Commission Commission (IATTC), and the 110-nation Intergovernmental Oceanographic Commission (IOC). The Commission is a semi-autonomous subsidiary of UNESCO and is the only organization responsible for coordinating and promoting marine science and technology and related services on a global basis. The U.S. decided that its international ocean science interests would be well served by maintaining its IOC membership, as permitted by the Commission's Statutes, after U.S. withdrawal from UNESCO. This will, in fact, allow the U.S. to better direct its endeavors in IOC toward high priority U.S. research efforts where gaps exist, such as global ocean/climate research.

Intergovernmental Oceanographic Commission (IOC)

A study conducted in 1984 by the Department of State, with the assistance of representatives of the technical agencies and marine academic community, showed that IOC has greatly benefitted the U.S. and the world community during its 25-year history. While much has been produced in terms of data and knowledge of the ocean, the greatest accomplishment of the IOC has been the incremental building of a very substantial infrastructure which is the foundation on which much of modern marine science depends. This slow but steady creation of an inter-related system, often under the leadership of U.S. oceanographers, has allowed the world marine scientific community to undertake a comprehensive attack on scientific and resource problems associated with the ocean and related atmospheric phenomena. A vast network has been built which both links IOC, scientists, governments, scientific bodies, and other intergovernmental organizations and constantly adds to the marine scientific research infrastructure and to research results. Much of this basic framework is used by marine scientists on a day-to-day basis in national projects, allowing them to relate their efforts and to build upon results obtained by other scientists and from other projects throughout the world, e.g. standards, formats, methodologies, intercomparisons, guidelines, and a uniform or compatible data base, as well as mechanisms for rapid exchange with others. Moreover, IOC projects have produced much in the way of useful research results which have contributed significantly to our knowledge of the ocean and our ability to cope with the myriad problems associated with the ocean. Since the U.S. EEZ is the world's largest, the benefits from such cooperation in the IOC and elsewhere have been very much to the advantage of the United States when compared with the costs.

U.S. academic and government scientists continue to be active in a broad variety of IOC projects on both a disciplinary basis (e.g. marine pollution) and a regional basis (e.g. the Caribbean and western Pacific), and in technical support, including monitoring (e.g. the Integrated Global Ocean Station System (IGOSS)) and data and information (e.g. the International Oceanographic Data Exchange (IODE) program). These cooperative efforts reduce research costs and duplication of effort, benefitting both the U.S. and other participants. Two areas of concern to IOC deserve special mention because of their potential for the future: the climate program and the living resources program.

Climate Program

The IOC is jointly sponsoring, with the Scientific Committee on Oceanic Research (SCOR), the Committee on Climate Change and the Ocean (CCCO). CCCO is charged with planning and coordinating the ocean aspects of the World Climate Research Programme (WCRP) sponsored by the World Meteorological Organization (WMO) and the International Council of Scientific Unions (ICSU). Although much of the program is still in advanced planning stages, the research and planning by CCCO have already indicated that ocean phenomena and their interactions with atmospheric phenomena can affect distant land and other ocean areas, often contributing to or being responsible for droughts and other forms of extreme weather experienced far from the sea. Ocean conditions in the tropical region have been reflected, for example, both in the "El Nino" phenomena affecting Peruvian coastal fisheries and land areas and in the severe winters and anomolous rainfall conditions experienced in North America in recent years. From the CCCO and WCRP climate/ocean studies we may be able to develop capabilities for predicting such events as the timing and strength of "El Nino" and the Indian sub-continent monsoon, which have enormous economic consequences, as well as the major weather patterns affecting the grain crops in the breadbasket of America.

The U.S. has been a major participant in CCCO and other aspects of the climate program. During 1984 the most significant development was the September scientific conference in Paris to complete planning for the Tropical Oceans and Global Atmosphere (TOGA) experiment which will commence in 1985. TOGA's objectives are 1) to determine the extent that time-dependent behavior of tropical oceans and global atmosphere is predictable, 2) understand the mechanisms, 3) study the feasibility of models for predicting variations, and, 4) if the feasibility is demonstrated, provide the scientific background for designing observation and data transmission

systems for operational prediction. This predictive capability would have such enormous societal value that the U.S. is vigorously supporting the climate program.

About 150 scientists from over 35 countries participated in the TOGA planning conference, representing a broad spectrum of both the oceanic and atmospheric communities. The interaction of the two communities is on a scale which has never before occurred, a recognition of the coupled scientific processes involved and the mutual needs of each community for data and support from the other. A scientific plan for the decade-long TOGA project was completed based on the discussions of the Paris conference in which American scientists played a major role. The scope of the TOGA experiment is so broad that international cooperation is essential to carrying it out. Even within the United States, which will be a major participant, extremely close collaboration will be required between the major participating agencies, NSF and NOAA, as well as contributing agencies such as NASA and ONR. A further TOGA conference late in 1985 is expected to indicate the extent of international commitments to the experiment, but a number of nations have already made informal commitments, are formulating plans, or are re-directing on-going efforts toward TOGA objectives. NOAA, for example, will devote $5.7 million in funding to TOGA in FY 85. Both NSF and NOAA will continue their research to build on pre-TOGA activities. A very careful examination will be required of the adequacy of funding for ocean and climate research activities over the next decade if the full potential of projects such as TOGA are to be realized.

Living Resources

Ocean Science in Relation to Living Resources (OSLR), a U.S. initiative now being developed and implemented as a program co-sponsored by IOC and the Fisheries Department of the Food and Agriculture Organization (FAO), provides an excellent illustration of the interrelationship between foreign policy and marine scientific research. Developing countries were making reasonable complaints that IOC had been doing little of direct interest to them, referring largely to fisheries research. At the same time, scientists primarily in the developed countries were coming to a clearer appreciation of the relationship between fisheries and the physical environment. The need for building scientific infrastructure to complement FAO's EEZ Programme of fisheries development and management was also recognized if developing countries are to achieve long-term success with living resources off their coasts.

The OSLR program responded to all of these concerns. In addition, it will provide short and long term research results which will assist both developed and developing countries to understanding the interaction between fisheries and the environment and in managing and conserving these valuable but vulnerable natural resources. The U.S. itself will be a primary beneficiary because we possess the world's largest fisheries resource in our EEZ. Developing countries will benefit from IOC responsiveness to their needs, including the benefit from research results off their coasts, the enhancement OSLR will provide to the EEZ Programme, and the expansion and improvement of their marine science and technology infrastructure. All of this should contribute to easing North-South tensions.

1984 saw OSLR development moving ahead, with very active U.S. participation and support. In July the joint IOC/FAO Guiding Group of Experts for OSLR held its initial meeting. They took a number of decisions to further promote and develop the OSLR program, adopted a Sardine-Anchovy Recruitment Project (SARP) as the OSLR pilot project, and elected an American scientist as chairman. In November the U.S. hosted a workshop for the detailed planning of SARP, with the initial steps of the project to take place off the Pacific coast of Latin America. In time, other areas will be encompassed by SARP, and similar projects will be developed for other species groups, and other OSLR projects will be implemented, eventually leading to a comprehensive understanding of the environmental effects on fisheries. While it is still too early to foretell what resources will be devoted to SARP and other OSLR projects over time, it is safe to say that since they will be augmenting on-going U.S. research efforts concerning the relationship between fisheries and the environment, the cooperative activities will be commensurate with the benefits gained and will be undertaken in light of domestic priorities.

SOPAC

An excellent example of a regional scientific program supportive of U.S. political and economic objectives is the SOPAC program developed by the Committee for the Coordination of Joint Prospecting for Mineral Resources in the South Pacific and co-sponsored by IOC and others, including the U.S. The program assists the South Pacific islands with exploring for offshore hydrocarbon and mineral resources, studying the development of the earth's crust, and advancing further tectonic theories relative to the region. Combined funding for the program totals $7.8 million, which is largely provided by the U.S. and Australian AID. While earlier oil reconnaissance surveys were not encouraging, 1984 SOPAC surveys, including

those of the U.S. Geological Survey, rekindled industrial interest, and research results have been sought by a number of oil companies. At least two basins with indications of a massive metalliferous sulfide deposit potential have been located which require further exploration. Thus, the program offers potential economic benefits for the region and there has been a transfer of technical knowledge which will enhance the ability of nations in the region to evaluate and exploit their economic zones.

Ocean Drilling Program

The Deep Sea Drilling Project (DSDP) came to an end in 1984 and its famous scientific drillship GLOMAR CHALLENGER was retired. Work continues on completion of the Initial Reports of the Deep Sea Drilling Project by international teams of shipboard scientists who conducted those cruises. The Ocean Drilling Program (ODP), currently sponsored by the National Science Foundation, is the successor to the Deep Sea Drilling Project and its International Program of Ocean Drilling (IPOD). The Ocean Drilling Program is a projected ten-year program of world-wide ocean drilling that will provide fundamental information about the history of the world's continents and ocean basins, the earth's changing environment, and the evolution of life. In addition to the U.S., six international members (Canada, France, the Federal Republic of Germany, Japan, the United Kingdom, and a consortium under the aegis of the European Science Foundation) have been planning the new scientific program as members of JOIDES, the Joint Oceanographic Institutions for Deep Earth Sampling. A new, larger drilling vessel, SEDCO/BP 471, was refitted from a commercial drilling configuration during 1984 to accommodate the new scientific program. It will commence scientific drilling in the North Atlantic in January of 1985, subsequently drilling in all of the world's oceans during the continuing years of the program. Two data-gathering circumnavigations of the globe are planned to build on knowledge gained in the Deep Sea Drilling Project. Approximately 34 percent of the effort in the Deep Sea Drilling Project was contributed by foreign scientists, significantly augmenting the scientific capabilities of the American drilling team. The ODP is expected to cost $376 million over the period 1985-94, of which $122 million, or 32 percent, is expected to be contributed by the foreign participants. The DSDP, in contrast, cost $235 million during the period 1967 through 1983, of which $179 million was expended on the 1975-83 IPOD. Of this $47 million or 26 percent was contributed by the international participants.

Ocean Remote Sensing

1984 saw major national and international satellite activities which renewed interest in oceanic remote sensing and safety-at-sea. In October, the U.S. signed agreements with Canada, France, and U.S.S.R. for an international Search and Rescue (SARSAT) program to improve the global safety net for distressed aviators or mariners. Canada and France provide the SARSAT payloads on U.S. civil polar-orbiting satellites, and rescues by the U.S. depend on cooperation between NOAA, the U.S. Air Force, and the U.S. Coast Guard. By mid-October 1984 SARSAT was credited with saving a total of 312 lives, of which 150 were sea rescues.

At the 1983 Summit of Industrialized Nations, the activities of the Working Group on Technology, Growth and Employment were endorsed, including those of the Committee on Earth Observations Satellites (IEOS-a name change occurred in September from the former title, "International Earth Observation Satellite Committee"). This Working Group focuses on land and oceanic activities and is presently structuring an international oceanic program based on a number of planned and proposed satellites, including the U.S. Navy Remote Ocean Sensing System (N-ROSS), the European Space Agency's first marine Earth Resources Satellite (ERS-1), the Canadian RADARSAT, Japan's first Marine Observation Satellite (MOS-1), and Earth Resources Satellite (J-ERS-1). All IEOS participants support international development subject to protection of each nation's value-added marine interests.

Exclusive Economic Zone (EEZ) Mapping Program

The Exclusive Economic Zone proclaimed by President Reagan on March 10, 1983 provides U.S. jurisdiction over seabed resources out to 200 nautical miles off the U.S. continental and island coast lines. The U.S. EEZ is the world's largest, but the extent of its resources is largely unknown. In response to the proclamation, the United States has accelerated its marine geologic sampling and mapping program. Continental shelf surveys for oil and gas and mineral deposits were increased both adjacent to the United States and in overseas areas of U.S. interest such as the Southwest Pacific (SOPAC), the Caribbean, and the Antarctic. A major initiative by the USGS was the mapping of the EEZ sea floor off California, Oregon, and Washington. More than 250,000 square miles of sea floor were mapped using the GLORIA sidescan system. GLORIA stands for Geological Long-Range Inclined Asdic (Asdic is a type of sonar). The GLORIA system, which maps swaths approximately 32 miles wide, is the only one of its type in the world. The instrument was developed by the United Kingdom,

Institute of Oceanographic Sciences, and the survey was conducted from a British ship as a cooperative scientific project between the IOS and the USGS. The 4-month survey concluded in August 1984 in San Diego; processing of the data and interpretation is underway by both U.S. and British scientists. Regional reconnaissance maps showing submarine volcanoes, landslides, faults, and other geologic features will be processed. Plans are underway for the joint program to continue in August 1985 with a survey of the U.S. EEZ in the Gulf of Mexico and Caribbean Sea as the next phase.

Signature of Seabed Mining Agreement

On August 3, 1984, the Provisional Understanding Regarding Deep Seabed Matters was signed by the United States, Belgium, France, FRG, Italy, Japan, the Netherlands and the United Kingdom. The Provisional Understanding constitutes an Agreement among the major industrialized nations with interests in deep seabed mining, aimed at avoiding conflicts over deep seabed mine sites and providing regular consultations with respect to deep seabed mining. The U.S. intends to continue to cooperate with these countries in deep seabed mining. The Agreement followed successful completion of a private industry agreement resolving overlapping sites among the seabed mining consortia.

The Agreement was undertaken pursuant to the Deep Seabed Hard Mineral Resources Act, Pub. L. No. 96-283 (the Act), which establishes a legal framework for United States' citizens to engage in the exploration for, and the commercial recovery of, the hard mineral resources of the deep seabed beyond the limits of national jurisdiction. The Agreement is also consistent with President Reagan's Ocean Policy Statement of March 10, 1983, which stated that the United States "will continue to work with other countries to develop a regime, free of unnecessary political and economic restraints, for mining deep seabed minerals beyond national jurisdiction."

Seabed mining legislation has also been enacted in the United Kingdom, France, the Federal Republic of Germany and Japan. Legislation is awaiting final approval in Italy. Belgium is considering similar legislation. The Netherlands has not yet taken action to adopt corresponding legislation.

Following the Agreement, the Administrator of the National Oceanic and Atmospheric Administration under Section 118 of the Act designated France, Japan, the Federal Republic of Germany and the United Kingdom as "Reciprocating States", based upon findings by the Secretary of State that those foreign nations:

1) regulate the conduct of their citizens in a manner compatible with the Act;

2) recognize authorizations issued by the United States;

3) recognize priorities of right for the issuance of authorizations, consistent with the Act; and

4) provide an interim legal framework which does not interfere with other States' exercise of high seas freedoms.

The United States is opposed to signature of the 1982 Law of the Sea Convention due to the fundamentally flawed deep seabed regime contained in Part XI of that Convention.

The conclusion of the Provisional Understanding is a significant and responsible step forward in the field of international affairs and the conduct of foreign relations. The understanding constitutes the only realistic and workable approach to deep seabed mining beyond the limits of national jurisdiction which has, to date, been achieved or which is likely to be achieved within the coming decade.

Antarctic Treaty and Antarctic Treaty System

The Antarctic Treaty, which grew out of the International Geophysical Year (IGY) of 1957-58, and the Antartic Treaty system were fully described in the 1984 Title V Report. The following updates matters related to the Treaty and the Treaty system.

As stated in last year's report, the Treaty perpetuates the informal IGY arrangements and creates a zone of peace south of 60 degrees South Latitude primarily devoted to scientific inquiry. Since the Treaty came into effect in 1961, twenty other nations have acceded to it. Of these, Poland, the Federal Republic of Germany, Brazil, and India have subsequently qualified to participate fully in the regular consultative meetings. Thus, there are now sixteen Antartic Treaty Consultative Parties. During 1984 the decision was taken to welcome henceforth all acceding states to Treaty meetings as observers.

The Antarctic Treaty System provides the framework within which the United States and other nations active in Antarctica approach the challenges and opportunities of resource activities in Antarctica. The creative legal accommodation contained in the Antarctic Treaty, which permits cooperation between nations holding differing views over the political

status of Antarctica, offers the basis for continued success in resolving difficult resource issues. 1984 was a very active year in the fields of Antarctic marine living resources and Antarctic mineral resources.

Antartic Marine Living Resources

In 1980, the Consultative Parties concluded the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) in Canberra, Australia. This Convention, an innovative, ecosystem-wide approach to managing living resources in antarctic waters, provides the necessary legal obligations and machinery to achieve conservation objectives.

The Commission and Scientific Committee established by CCAMLR held their third annual meeting at the Commission headquarters in Hobart, Australia, during September 1984. Reports issued by the Scientific Committee resulted in conservation measures for fishing in the Atlantic sector, particularly around South Georgia Island, and in minimum mesh size restrictions for nets used in fishing activities throughout the Convention area. The 1984 meetings demonstrated the successful transition of the Convention's institutions from start-up to implementation.

Antartic Mineral Resources

Negotiations by the Consultative Parties on a regime for antartic mineral resources opened in mid-1982. Since then, four additional meetings have been held, including informal sessions in Washington and Tokyo in January and May of 1984, respectively. The next round is scheduled for early 1985 in Brazil.

As pointed out in the 1984 Title V Report, the Antartic Treaty, with its strong science component, benefits the U.S. by contributing, through the extensive research and resource management in the area, to a greater understanding of the planet. Also, by maintaining Antartica exclusively for peaceful purposes, the U.S. benefits from the Treaty's contribution to international peace and security.

International Whaling Commission (IWC)

Since 1972, the basic goal of United States whaling policy has been a moratorium on commercial whaling, an objective endorsed by President Reagan. In 1982 the International Whaling Commission (IWC) adopted a moratorium on commercial whaling beginning in late 1985. The three-year delay provides an adjustment or phase-out period for nations engaged in commercial whaling. Catch limits, however, continue to be set

at a level to allow continued whaling during the transition, although, at the 36th annual meeting of the IWC in June 1984, catch limits were reduced an overall 30 percent from previous levels.

The Governments of Japan, Norway and the Soviet Union objected to the moratorium decision. Japan also lodged an objection to the IWC prohibition on sperm whaling which went into effect in October 1984. According to the IWC Convention, parties lodging an objection to an IWC decision are not bound by that decision. On November 13, 1984 the Secretary of Commerce exchanged letters with the Charge d'Affaires ad interim of Japan. The exchange of letters incorporated an understanding designed to bring about an end to Japanese commercial whaling, including taking of sperm whales. The first stage of this arrangement provided that if Japan withdrew its objection to the sperm whaling prohibition by December 13, to be effective no later than 1988, the U.S. would not certify Japan and apply sanctions for the taking of up to 400 sperm whales in this past season (1984) and the next season (1985). This condition was met by Japan's withdrawal of its objection on the sperm whale prohibition on December 11, 1984. In the second stage of the arrangement, if Japan agrees to withdraw its objection prospectively to the moratorium by April 1, 1985, Japan may whale for, at most, two years beyond the dates contemplated by the IWC commercial moratorium without the U.S. invoking sanctions. Sperm whale catch limits would be set at no more than 200 whales for the two additional seasons with catch limits for other whales to be established by the U.S. in consultation with Japan, using as a guide the last quotas voted by the IWC.

If this arrangement is fully accepted by Japan, Japan will be bound by the International Convention for the Regulation of Whaling (Convention) to eventually adhere to the moratorium and in the interim accept catch limits based on those set under the Convention. If Japan fails at any time to adequately perform under the arrangement, the Secretary of Commerce has reserved his right to determine that Japanese whaling diminishes the effectiveness of the Convention or its conservation program and therefore certify Japan under the Pell and Packwood-Magnuson Amendments.

We believe that such a commitment by Japan reflected in the exchange of letters on November 13, 1984, represents a positive result for the IWC and for the whales. The U.S. strongly supports the full and effective implementation of the moratorium on commercial whaling. We will continue our efforts to encourage adherence by all governments in order to achieve successful implementation of this goal.

Marine Pollution

Cartagena Convention

As reported in the 1984 Title V Report, negotiations were concluded in 1983 on the Convention for the Protection and Development of the Natural Resources and Marine Environment of the Caribbean Region, also called the "Cartagena Convention." The Convention, which was adopted and signed in 1983 by the U.S. and 15 other nations at a conference held at Cartagena, Colombia, was signed by President Reagan in September 1984. With the deposit in October of the U.S. instrument of ratification, the U.S., thereby, became the first country to ratify the Convention. Negotiations to establish a similar regional convention for the South Pacific have been taking place at Noumea, New Caledonia. The U.S. is continuing its active participation in these negotiations.

Conventions on Pollution Liability Standards

As an active participant in the International Maritime Organization (IMO), a specialized agency of the United Nations concerned with maritime affairs, the U.S. has been seeking improvements in the standards of liability for pollution incidents. As reported in the 1984 Title V, the U.S. did not ratify two international conventions primarily because of concerns that the liability limits were too low. The IMO Legal Committee has since completed draft revisions to increase substantially liability limits and update several other important aspects of these conventions. These revisions were considered by a plenipotentiary conference of the IMO in May 1984. The Conference adopted new liability limits very close to those proposed by the U.S. along with several other desirable changes. As a result, the U.S. is now in a favorable position to ratify both conventions, thus providing significant deterrents to oil pollution incidents and added protection for the victims of oil pollution. Domestic implementing legislation for these conventions passed the House with strong support from the Administration but failed to pass the Senate during the 98th Congress.

A draft convention on Liability and Compensation for the carriage of noxious and hazardous substances by sea was also considered by the May 1984 conference but proved too complex to permit adoption. The draft convention was returned to the IMO Legal Committee for further study.

CHAPTER 11 - TELECOMMUNICATIONS

Deregulation of telecommunications continues to grow in significance and played an important role in the achievement of U.S. international telecommunications objectives during 1984.

Worldwide, the telecommunications industry today is experiencing major changes as a consequence of (1) advances in technology -- chiefly those associated with the "micro-electronics revolution," (2) shifts in the character and magnitude of business and consumer demand, and (3) resulting increased competition. Communications satellites constitute an important force contributing to these major changes. This is an area where the United States has enjoyed a significant, albeit narrow, technological edge. Communications satellites should continue to reshape both the U.S. and domestic and international communications environments, and U.S. Government policies and research programs should continue to play an important role, in these developments.

President Reagan's determination on November 28, 1984 that separate international communications satellite systems are required in the national interest will promote competition in the provision of international telecommunications services.

The United States is selectively seeking to engage a number of other countries in bilateral discussions on a broad range of telecommunications and information issues. The Department of State has recently led interagency delegations in discussions with U.K., the Netherlands, the Federal Republic of Germany, Canada, Mexico, and Japan seeking to gain common understanding in areas of mutual interest such as future conferences of the ITU, international satellite policy, transborder data flows, and methods of responding to the communications development needs of the developing countries.

International Telecommunication Union (ITU)

The major forum for discussion in 1984 was again the ITU. The First Session of the World Administrative Radio Conference for the Planning of the High Frequency Bands Allocated to the Broadcasting Service was held in Geneva, January 10-February 11, 1984. The Conference was concerned with reaching agreement on technical parameters, planning principles and a planning method that would reduce interference in the HF broadcasting bands. U.S. interest in the Conference flowed from the vital foreign policy roles of the Voice of America and Radio Free Europe/Radio Liberty, the needs of private U.S. broadcasters, and the traditional U.S. commitment to the free flow of information across national boundaries. All the major conference decisions were in general accord with U.S.

the destination administration; lifting restrictions which would have limited participation in CCITT study groups and working groups to administrations or to established carriers recognized by administrations; adopting recommendations which set interworking guidelines between various regional videotex networks employing three currently recognized videotex standards used in North America, France and Japan; eliminating "human factors" specifications in standards for video display terminals, and clarifying a recommendation on message handling services to assure international telecommunications users that there would be no restrictions in their use of international leased lines as a result of the recommendation.

The Plenary Assembly also elected a German national, Mr. T. Irmer, as Director of CCITT for the next fours years, made structural adjustments to certain study and working groups, and agreed to form a preparatory committee for the 1988 World Administrative Telegraph and Telephone Conference (WATTC). The preparatory committee will organize a draft framework for new international rules to replace the existing telegraph and telephone regulations. This will be provided to the 1988 WATTC.

International Telecommunications Satellite Organization(INTELSAT)

The Board of Governors of INTELSAT approved the introduction of improved efficiencies in the organization by realignment of the executive organ, streamlining procedures for documentation, and transferring certain routine functions to the Director General. Many additional new services were also introduced in 1984. Provision of full and fractional transponder uses for digital TV distribution, integrated video and data, and international business leases were approved. A new micro-terminal service called INTELNET which permits use of very small inexpensive antennas for very low speed data was approved in principle. New preemptible and non-preemptible leased international video services were agreed to and revisions were made for booking procedures to aid in advance planning for occasional use of television worldwide. INTELSAT has undertaken a review of its general charging policies in view of the introduction of so many new services.

At its annual meeting INTELSAT signatories expressed opposition to developments in the U.S. towards establishment of separate international satellite systems. The meeting adopted a resolution urging all signatories to refrain from entering into any arrangements which may lead to the establishment and subsequent use of these types of systems.

International Maritime Satellite Organization(INMARSAT)

INMARSAT has grown to 41 member countries representing more than 85 percent of the world's merchant shipping. About 2700 ships are outfitted with satellite terminals. In 1984, INMARSAT continued its leasing services through INTELSAT V satellites, a MARECS leased satellite from the European Space Agency and MARISAT satellites leased from COMSAT General, USA.

On April 2, 1984 proposals for the second generation INMARSAT system were received from two international consortia, one led by British Aerospace with Hughes Aircraft and SATCOM International, the other led by Marconi with Ford Aerospace and Aerospatiale. The Director General has been authorized to conduct negotiations with both bidders to improve their basic offers and to provide conclusions and recommendations in early 1985.

In October 1984, Norway and the United Kingdom proposed amendments to the INMARSAT Convention and Operating Agreement to enable INMARSAT to provide aeronautical communications services. The proposals are generally consistent with the U.S. view that INMARSAT not be granted a monopoly in the provision of these services.

The organization continues to maintain a close working relationship with the International Maritime Organization, particularly in relation to development of the Future Global Maritime Distress and Safety System (FGMDSS).

Current Issues in Telecommunications

Five U.S. firms have applied to the FCC for authority to provide international satellite communications. After reviewing the applications in light of U.S. national interest and U.S. obligations under the INTELSAT Agreement, the Departments of Commerce and State forwarded recommendations to the President. On November 28, 1984 President Reagan determined that separate international satellite systems are required in the national interest. The President stated that the United States, in order to meet its obligations under the Agreement establishing the International Telecommunications Satellite Organization (INTELSAT) (TIAS 7532), shall consult with INTELSAT regarding such separate systems as are authorized by the Federal Communications Commission. He directed the Secretaries of State and Commerce jointly to inform the Federal Communications Commission of criteria necessary to ensure the United States meets its international obligations and to further its telecommunications and foreign policy interests.

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In October, 1984 Tel-Optik Limited and Submarine Lightwave Cable Co., respectively, applied to the FCC for landing rights in the United States for private transatlantic fiber optic cables. Landing rights have already been authorized for a transatlantic fiber optic cable (TAT-8) which will be co-owned by U.S. carriers and their European correspondents and will be available for introduction into service in mid-1988.

The Presidential decision concerning international satellite systems and the applications for additional transatlantic cables will likely promote competition, intramodal and intermodal, among international cables and satellites and should foster competition among telecommunication common carriers and non-common carriers.

The OECD continues to consider matters concerning transborder data flows through its ICCP committee. The "data declaration" introduced by the U.S., and now called the "Statement of General Intent," is being discussed in several venues. Most OECD countries favor some general statement about the matter, although several Western European countries are concerned about the statement's scope. The U.S. was looking forward to approval early in 1985 of a statement incorporating a commitment to relatively free circulation of data, avoidance of further barriers, and cooperation among nations to further these goals.

National Telecommunications and Information Agency(NTIA)

Extensive research and development efforts focusing on satellite communications are conducted by the Institute for Telecommunication Sciences, the scientific arm of the National Telecommunications and Information Agency (NTIA), U.S. Department of Commerce. These NTIA research programs include: (1) support of U.S. planning and preparation for the International Telecommunication Union's 1985/1988 World Administrative Radio Conference on Space Services, (2) refinement of computer programs and systems necessary for analyzing geostationary satellite orbit use, (3) research into the use of satellites to provide "thin-route" communication services, including the development of small earth stations in conjunction with the Agency for International Development's (AID) Rural Satellite Program, (4) research into the development of low-cost, satellite based educational and instructional television systems, also in conjunction with AID, (5) planning of experimental work that governments may undertake in conjunction with NASA's Advanced Communications Technology Satellite Program, and (6) studies of the impact on small earth station antennas of recent decisions to reduce orbital spacing between satellites to two degrees.

The fundamental objectives of those extensive NTIA research efforts are to foster more efficient use and development of communications satellite technology, to ensure that U.S. communications and aerospace firms will continue to enjoy full and fair competitive opportunities both serving domestic markets and abroad, and to encourage application of satellite communications technology to meet important international economic and social needs, such as improved communications and education in developing nations.

CHAPTER 12 - TRANSPORTATION

The Department of Transportation (DOT) continued and expanded its international activities during Fiscal Year 1984 in accordance with the general program organization and the missions of its offices and administrations set out in the Fourth and Fifth Title V Annual Reports to Congress.

DOT objectives in carrying out its international activities are to access and share transport technology and experience to reduce research costs and duplication of parallel national efforts; to find solutions to problems of mutual concern; to provide a vehicle for collaborating on special multilateral research projects and coordinating national positions in international organizations; to support U.S. foreign policy, and to promote sales of U.S. transportation equipment and technology.

The Department has formal and informal bilateral agreements for the exchange of information with twenty-three countries, participates in varying degrees of intensity with some two dozen international organizations, and is currently involved in providing cost-reimbursable technical assistance to approximately sixty countries. The following summary of major achievements for FY 1984 was selected as representive of recent or substantial progress toward fulfillment of one or more DOT objectives.

Major Achievements

Bilateral Programs

Brazil

Secretary of Transportation Elizabeth Hanford Dole and the Brazilian Minister of Transportation and Public Works agreed at a meeting in 1983 to resume negotiation of a Memorandum of Understanding (MOU). Negotiations on this MOU were accelerated by Department of Commerce interest in facilitating U.S. private sector participation in Brazilian transportation infrastructure projects. The MOU, concluded in March 1984, calls for exchange of information and development of research agreements in areas of urban passenger, railroad, and highway transport. Discussions are also underway concerning the possibility of establishing joint working groups in the areas of urban mass transit and alternative fuel technology.

The MOU and aviation technical assistance activities will allow the U.S. and Brazil to share the benefits of research in agreed areas and will enhance prospects for U.S. private sector participation in Brazilian infrastructure development.

Canada

In addition to continuation of research exchanges and discussions on all modes of transport, agreement was reached on a 5th Addendum to the DOT-Transport Canada Memorandum of Understanding (MOU) between the Canadian Surface Transportation Administration and the Road Safety and Motor Vehicle Regulation Directorate and the National Highway Traffic Safety Administration of DOT. Initial areas for cooperative work are: traffic safety, crash avoidance, crash worthiness, and the collection and analysis of road safety data. Activities under the MOU will involve exchange of research results and meetings between specialists to address specific problems.

Agreement on a 6th Addendum to the MOU between the Canadian Marine Transportation Administration and the U.S. Maritime Administration (MARAD) has also been reached but not formally signed. Activities under this agreement call for 1) exchanges of research results, workshops, and operational task-sharing projects on ship construction and navigation in Arctic conditions, 2) development of marine systems to benefit trade between the two countries, and 3) work toward solutions to other common maritime transport problems. This Addendum will replace the 1981 MOU between the Department of Commerce (DOC) and Canadian counterparts which served as the umbrella for cooperative activities when MARAD was part of DOC.

Further, specialists in the Research and Special Programs Administration (RSPA) of DOT worked closely with their counterparts at Transport Canada on regulations concerning the transport of hazardous materials. With the Canadian Government publishing new national regulations for the transport of these materials, close liaison will be particularly important to insure the continued free flow of trade in these goods between the United States and Canada.

Given the commonality of problems and the border interface of national transport systems, DOT believes that cooperation in transportation research and development and continuation of a dialogue on transport-related policies are mutually beneficial to the U.S. and Canada.

Federal Republic of Germany (FRG)

Since 1973, DOT has been actively cooperating with the FRG Ministry of Transport (MOT) and Ministry of Research and Technology (MORT) primarily on advanced technology involving improvements in urban transport systems. During a March 1984 DOT-MOT/MORT cooperation program review meeting in Washington, a new project agreement on urban transit bus technology was signed. This agreement calls for the exchange of research results, meetings of specialists, and joint research on innovative bus systems and subsystems to reduce operating and maintenance costs and to provide more effective transportation. A delegation from the Urban Mass Transportaton Administration (DOT) visited Germany in June to begin the exchanges.

The terms of an additional project agreement concerning highway engineering and operations research between DOT and MOT have been essentially agreed. The cooperative areas are alternate routing systems in freeway corridors, urban network signal control systems, improved accident analysis and safety evaluations, coatings for structural steel, fatigue and corrosion of bridge cables, and experimental verification of pavement design methodology.

Specialists in both countries agree that the cooperative program, particularly exchanges regarding land transport systems in large metropolitan areas, has reduced costs of parallel national research and provided a unique forum for fruitful discussions of operational experience, environmental concerns, and innovative technology.

Hungary

Exchanges of delegations and general transportation technology have been carried out with Hungarian counterparts since the early 1970's. Following the conclusion of a Memorandum of Understanding (MOU) between DOT and Hungarian Ministry of Transport (MOT) in 1978, cooperation became much more effective through identification of seven areas for cooperation relating to rail track deformation, highway and bridge design and construction, and traffic planning and control.

Early in 1984 two project agreements on the design and construction of highways and bridges were signed involving specific exchanges of research results between the Federal Highway Administration and the Hungarian Road and Railway Design Bureau (UVATERV).

DOT has found that Hungarians are doing advanced and highly complementary research in the areas identified for cooperation under the MOU, and both sides have benefited from exchanges of research reports in the rail track area under a project agreement concluded in 1983. It was agreed during a June 1984 meeting between the Deputy Secretary of Transportation and the Deputy Minister (now Minister) of Transport that cooperation between DOT and MOT should be encouraged and expanded.

Italy

Under sponsorship of the International Center for Transportation Studies (ICTS), three DOT specialists presented papers on airport, rail, and highway network planning at a seminar on transportation systems infrastructure planning in Amalfi, Italy, November 1983. Travel for DOT participants was provided by the Italians.

During a September 1984 meeting with the Secretary of Transportation, the Italian Minister of Transportation proposed that the 1969 DOT-MOT Memorandum of Understanding be updated and expanded in areas of current mutual interest, such as safety, containerization, emergency transportation, and intermodal freight transport. Negotiations to determine specific, mutually beneficial cooperative activities and the continuation of transportation exchanges are planned for 1985.

Renewed ties with Italian transport entities provide opportunities for expansion of trade through exposure to the transport industry capabilities of both countries, while also supporting the work of each country in international organizations (e.g., OECD).

Saudi Arabia

The Office of the Secretary and the Federal Highway Administration continued implementation of a multi-million dollar reimbursable technical assistance program with Saudi Arabia. This program involves assisting the Saudis with technical management of their transportation operations, building a modern highway, and establishing a government entity for highway management.

During 1984, a major review of all Saudi highway projects under design or construction was performed by a joint Saudi-U.S. team of engineers. A new agreement for technical assistance in all on-going areas was concluded between DOT and the Saudi Ministry of Communications. Technical training was provided for eight Saudi engineers at American universities and state departments of transportation.

The Federal Aviation Administration (FAA) has provided airmen-certification support and aircraft-type ratings for 750 Saudi Airlines personnel under a 1982 aviation bilateral agreement which was to have expired in September 1984. The present agreement was extended to allow time for negotiation of a new agreement based on a Saudi request to expand and extend the program for four years. Such an expanded agreement, which would include additional aircraft rating types and a transition program for Saudi purchase of Boeing aircraft (scheduled for delivery in mid-1985), would increase the current FAA certification program in 1985 to include an estimated 1,100 Saudi personnel. The FAA will only agree to this expansion provided the Saudis begin assuming airmen certification responsibility. Services will continue at present levels if such agreement cannot be reached.

U.S. technical assistance to Saudi Arabia accelerates considerably the development of advanced Saudi transport systems and Saudi management capabilities for maintaining and expanding these systems, while, at the same time, providing opportunities for sales of U.S. technology and equipment.

Spain

During 1984, DOT actively participated in a U.S.-Spain Science and Technology Commission program, under the cognizance of the Department of State, to review research proposals from U.S. and Spanish academic institutions. The Federal Highway Administration has endorsed and the Department of State approved one research proposal for bilateral bridge construction involving an analysis of complex concrete bridges.

The FAA also provided during 1984 technical assistance on a temporary duty basis to Spanish aviation authorities in the areas of radar/automation and airport certification. One FAA specialist was selected as the senior technical adviser. In June the FAA also extended its technical arrangement with the Spanish Civil Aviation

Authority after separating it from a larger bilateral agreement under negotiation. The extension will remain in effect for one year or until the new bilateral agreement becomes effective.

Cooperation with Spain benefit both countries by contributing to basic research on bridge structures and providing opportunities for sales of U.S. technology and equipment.

Yugoslavia

DOT received approximately $67,000 in special foreign currency during FY 1984 under the U.S.-Yugoslavia Science and Technology Agreement for funding transport research projects by Yugoslav scientists.

Under this agreement, DOT highway specialists continued to monitor research on production of high strength durable concrete with reduced energy inputs and a project on settlement of embankments in soft soils. A new project to better understand bridge resistance to earthquakes was also approved for funding by the U.S.-Yugoslavia Joint Board.

Through meetings held in 1984, U.S. and Yugoslav specialists agreed that insufficient attention has been given to basic research on earthquake-resistant transportation structures - a vital part of the lifeline support process during and following earthquakes.

Technical studies done by Yugoslav scientists are of superior quality and complement DOT highway research studies at minimum cost, thus increasing the total value of each country's efforts. Yugoslav scientists have correlated significant European transport technology with research being carried out in the United States and other countries.

Multilateral Programs

Experimental Safety Vehicle Program

The National Highway Traffic Safety Administration represents the United States in the international technical program on Experimental Safety Vehicles (ESV). The British Government will host the Tenth International Technical Conference on Experimental Safety Vehicles in July 1985. These conferences, held biennially on a

rotating basis in the involved countries, are the result of agreements between the U.S. Government and the Governments of the United Kingdom, France, Federal Republic of Germany, Italy, Sweden, and Japan. Major automotive manufacturers and senior government transportation officials participate to exchange research results and progress in safety programs and to discuss other common problems. Additionally, under the auspices of the program, numerous cooperative safety research projects are undertaken. DOT expenses are estimated at approximately $5,000 per year, including travel and staff time.

Country representatives agree that the ESV program has produced significant advances in vehicle safety on a worldwide basis. The report on the proceedings of these conferences is considered the most definitive document published on the state-of-the-art in vehicle safety research.

European Conference of Ministers of Transport

The European Conference of Ministers of Transport (ECMT) was founded in 1953 to achieve the most efficient use and rational development of European inland transport and to coordinate and promote activities of concerned international organizations. Its membership is comprised of nineteen European nations and includes Australia, Canada, Japan, and the United States as Associate Members with observer status.

ECMT is a working organization concerned with transport policy and all aspects of the economic and commercial operation of transport services, routes, investment, and such technical aspects of transport as road traffic rules, safety, and signs and signals. It also has an interest in urban transport problems, pipeline transport, transport and the environment, cooperation among different modes, combined transport, and standardization. The ECMT becomes involved in air and sea transport issues only in relation to their impact on inland transport.

The Secretary of Transportation attended the Spring 1984 59th Session of the ECMT Council of Ministers held in Oslo, Norway. In a statement to the Council, the Secretary stressed the important role of transportation in the life of countries; the goals and achievements of ECMT; the benefits realized by the United States from its technical cooperation with other countries; the

establishment of fora to resolve policy issues, and the economic benefits and impacts of deregulation of U.S. aviation, rail, trucking, bus, and maritime industries. The Secretary also emphasized the U.S. primary interest in transport safety, particularly the use of safety belts.

DOT involvement in ECMT activities, particularly the senior-level representation at the Council Sessions, provides a significant opportunity to meet with foreign counterparts and to reinforce cooperative relationships.

International Civil Aviation Organization

As outlined in the Fifth Annual Title V Report, the FAA is now engaged in implementing a National Airspace System (NAS) Plan, which is a modernization effort to meet future demand for air transport with improved safety, fewer delays, reduced fuel consumption, more direct routings, better quality service, and lower costs.

Modernization, however, must take full account of the world situation and the standards and practices which have been developed over many years in the international aviation community. Eighty-five U.S. airports are designated to serve international operations, and more than 10,000 operations each week are scheduled for aircraft services originating from or departing for destinations outside the United States.

The International Civil Aviation Organization (ICAO) is the principal body within the United Nations system for the development of international aviation standards and procedures. As a world leader in aviation, it is essential that new U.S. systems conform to international standards adopted by ICAO. During 1984, the FAA made a special effort to insure that international users of the new systems were fully aware that the basic requirements will be standards and capabilities under consideration by ICAO. In preparation for implementation of the new systems, the FAA has participated actively in ICAO working groups which are responsible for developing international standards. The following developments should be noted:

- The Microwave Landing System, an important part of the NAS, has reached the final stages of international standardization.

- An ICAO panel was established to develop detailed standards and agreements for the Secondary Surveillance Radar System (SSR), Mode S, which, along with its data link capability, will form the basis for greatly improved surveillance and communication services.

- The FAA has worked closely with the new ICAO SSR Improvements and Collision Avoidance Systems Panel to effect worldwide application of the techniques involved.

- A Collision Avoidance System for domestic U.S. application was presented to the International Aviation Review Committee for study.

- U.S. airspace users will be required to carry 25KHz VHF communications equipment, especially during the period of transition to extensive use of the Mode S data link.

Participation in ICAO enables the United States to ensure development of the highest possible international standards, to promote U.S. aeronautical exports by assuring compatibility between international and U.S. standards, and to demonstrate U.S. leadership in world aviation. (See also section on Transport of Hazardous Materials.)

International Maritime Organization

The U.S. Coast Guard maintains an active leadership role in the International Maritime Organization (IMO) which is the United Nations body responsible for technical shipping matters. Maritime safety and marine environment protection are the main issues relating to science and technology. The work of the organization also involves technical discussions on fire protection, containers, ship design, and bulk chemicals with a view to recommending appropriate regulations or standards for adoption by member countries.

The Coast Guard is responsible for U.S. implementation of the 1974 Safety of Life at Sea Convention and implementation and enforcement of Annex I (Oil Pollution) of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) of October 2, 1983. Since then, the Coast Guard has been paving the way for

the implementation of MARPOL Annex II (Noxious Liquid Substances in Bulk), presently scheduled to become effective in 1986. It has also been coordinating the completion of a questionnaire concerning the Optional Annexes to MARPOL with a view toward possible U.S. ratification.

The Coast Guard has also been involved in efforts to improve the IMO's Civil Liability and Fund Conventions for oil pollution liability. In May 1984, the Coast Guard attended a diplomatic conference in London at which Protocols were developed for these two Conventions. During the conference at a meeting with the IMO Secretary General, the Secretary of Transportation expressed U.S. support for sound revisions to these Conventions. Her personal involvement was important to the success of the U.S. Delegation in obtaining levels of liability more compatible with existing domestic legislation, thus increasing the possibility of ratification by the United States.

Since October 1983, the Coast Guard has provided an officer for the position of IMP Regional Pollution Consultant for the Caribbean. The existence of this position represents a cooperative effort of the IMO, the U.S. Agency for International Development (AID), and the Coast Guard. These three organizations have agreed to maintain the position through October 1985. Funding is provided by AID under a 1983 interagency agreement for reimbursable, pollution-related foreign assistance.

The United States has benefited by having many of its positions on technical issues adopted as the international standard in various IMO treaties, regulations, and circulars. Most of the world's maritime nations have adopted IMO safety and pollution prevention international standards. This insures that the many thousands of foreign ships arriving at our ports each year are constructed, maintained, manned and operated in a manner which provides for maximum possible safety of life at sea and protection of the coastal environment. (See also section on Transport of Hazardous Materials.)

Organization of American States

In April 1983, the United States, through the Maritime Administraton (MARAD), was elected to Chair Committee III - Port Training, under the Permanent Technical Committee on Ports of the Organization of American States (OAS). The mandate was to develop and execute programs and seminars on:

- Port Safety and Security. A seminar was held in Barbados in March 1984.

- Water Pollution. A seminar was held in cooperation with the U.S. Coast Guard in Tampico, Mexico, in October 1984.

- Multi-modal Transportation Programs. Preparations are being made to hold a seminar in Guayaquil, Ecuador, in May 1985.

- Sedimentation Control. Technical advice to Argentina on dredging problems was provided in cooperation with the U.S. Army Corps of Engineers in Buenos Aires in May 1984.

- Puertos Amigos Program. MARAD, the OAS, and the American Association of Port Authorities coordinate this program, under which OAS member countries send personnel to U.S. and Canadian ports to receive free training in various port development areas. No expenditure of U.S. Federal funds is involved. Transportation and per diem costs are funded by the OAS member nations. Seven OAS member countries have requested training for 201 personnel under this program.

Technical benefits to OAS member nations will create opportunities for increasing marine environmental control, safety, and trade in the Western Hemisphere.

Organization for Economic Cooperation and Development (OECD) Road Transport Research Program

The OECD Road Transport Research Program (RTRP) was created by a decision of the OECD Council on December 19, 1967, to provide scientific and technical support to member governments, to assist them in their decision-making on matters relating to roads and road transport, and to promote cooperation in this field through the consolidation and exchange of information. These purposes are accomplished through the International Road Research Documentation Program (IRRD), a cooperative, computerized system for the regular exchange of scientific and technical literature of member countries, and a triennial program of research activities.

In 1984, an agreement in principle was reached between the U.S. Transportation Research Board (TRB) and the Road Transport Research Steering Committee to grant access by all OECD member-nation entities to the computerized,

on-line U.S. Transportation Research Information System (TRIS) on a cost-use formula basis. Heretofore, TRIS-on-Line was accessible only by U.S. and Canadian users in deference to OECD's desire to allow time for its IRRD system to become well-established and self-supporing through usage by European users.

Activities of the RTPR triennial program (1983-1985) cover a wide range of topics on road transport strategies, road traffic control and driver communication systems, road safety programs, and highway infrastructure.

During 1984, the National Highway Traffic Safety Administration (NHTSA) initiated a project to evaluate the effectiveness of safety belt usage programs among participating countries. NHTSA receives information from various countries on national safety belt use rates, the effects of enforcement legislation, and related accident statistics as part of the preparations for a symposium to be hosted by the United States in the spring of 1985 in Washington, D.C.

A pavement test program was conducted in Nardo, Italy, in April 1984 under the auspices of the RTRP Scientific Expert Group on Full-Scale Pavement Tests. Ten countries, including the United States, contributed funds and technical expertise to carry out the program. Since the results of the tests were shared, DOT Federal Highway Administration specialists consider its $10,000 contribution as exceptionally cost-effective and an excellent example of technical and economic benefits gained through multilateral cooperation.

Detailed studies were also completed on the scientific evaluation of coordinated urban transport pricing and integrated safety programs, both of which included significant contributions by U.S. experts.

Each research group is led by a pilot country which provides a background paper, guidance, and leadership throughout the 18-month cycle of work. The finished product is a collaborative report containing the collective research, analysis, and judgments of experts in all participating countries and contains specific recommendations for problem-solving or other action.

Multilateral research results in increased benefits for all. Duplication of efforts and repetition of previous mistakes are avoided. Collective action on a specific problem conserves national resources, and, most importantly, every country gains from research carried out by the respective pilot countries.

Pan American Railway Congress Association

The Pan American Railway Congress Association (PARCA) is a permanent international organization composed of nineteen governments, railroads, allied institutions, industrial suppliers, and others who are interested in advancements in rail transportation in the Western Hemisphere. PARCA enjoys quasi-official status with the OAS though a 1953 agreement. Public Law 794, of June 1948, authorized U.S. Government participation in the organization. The statute provides for Presidential appointment of delegates to PARCA and authorizes the Department of State to provide funds for expenses incident to U.S. participation.

During most of 1984, the Federal Railroad Administration, in cooperation with the Association of American Railroads, made preparations for sponsoring the XVIth Pan American Railway Congress held during October 3-9, 1984, in Washington, D.C. The theme of this year's Congress was: "Railroads and the Quality of Life." In conjunction with the Congress, the Railway Progress Institute and several private sector groups co-sponsored an International Railway Equipment and Supply Exhibition. Representatives from twenty-seven nations attended the conference, including delegations from eleven PARCA-member nations. Fifty-three representatives presented technical papers, and special presentations were given on rail technology, regional railroads, deregulation, and World Bank financing in Latin America.

Government and private sector representatives attending the Congress, who rarely have an opportunity to personally exchange technical information and operational experience, agreed that significant technical benefits were gained from the program and through formal and informal discussions. A general consensus was that PARCA should build on the successes of its XVIth Congress by developing and maintaining a technical exchange and information network; identifying opportunities for public and private sector cooperation, and expanding application of U.S. technology in the Western Hemisphere.

Science and Technology for Transport Development

Africa

Beginning in early 1984 under direction of the Secretary of Transportation, a significant effort to address and alleviate transport and distribution problems inhibiting food relief efforts in Africa was undertaken by DOT staff. Working closely with the Agency for International Development (AID) and other agencies on the Interagency Third World Hunger Study Group, a preliminary report on critical transport problems was prepared. General conclusions of the report were that deteriorating infrastructures or lack of systems seriously impair efforts to distribute food shipments, and recommendations were made to focus attention on the need for a coordinated response. Specific recommendations were made for improving transport systems in Ethiopia, Ghana, Mauritania, Mozambique, and Zimbabwe. Further, a DOT Working Group was formed to coordinate other DOT initiatives and efforts on African transport problems. Both the interagency and internal DOT efforts are to be continued during the next fiscal year.

Caribbean

DOT technical staff have participated with AID and other agencies in efforts under the Caribbean Basin Initiative (CBI) to improve efficiency and decrease costs of moving cargoes and people in that region. Since the summer of 1984, DOT's Office of Policy and International Affairs has been leading a working group on transportation with the CBI Subcommittee on Operations.

Further, DOT specialists under contract with AID, assisted by MARAD staff, conducted the first phase of a detailed study of maritime transport problems in the Caribbean, with special emphasis on the East Caribbean. AID has requested a follow-on study by DOT which is expected to be completed during the spring of 1985.

Additionally, the Federal Aviation Administration continued to provide technical advice under bilateral agreements on airways and airport projects to various countries in the Caribbean Region. The U.S. Coast Guard's efforts in the region are described under the section on Internationational Maritime Organization.

Successful efforts to improve transport systems in Africa and the Caribbean will benefit the affected countries and contribute significantly to regional economic development and political stability. The United States can expect a positive impact on its bilateral and regional relationships.

Transport of Hazardous Materials

The Research and Special Programs Administration continued participation in the work of a number of international organizations concerned with the development of regulations and standards regarding the international transport of hazardous materials by all modes of transport (hazardous materials are often referred to as "dangerous goods" by international organizations.) These organizations include the Committee of Experts on the Transport of Dangerous Goods of the United Nations Economic and Social Council, the Dangerous Goods Panel of the International Civil Aviation Organization, the Subcommittee on the Carriage of Dangerous Goods of the International Maritime Organization, the International Atomic Energy Agency, and the Group of Experts on the Transport of Dangerous Goods of the United Nations Economic Commission for Europe.

The significant part of the work accomplished was the improvement and updating of the codes, standards, and conventions governing the international transport of hazardous materials to take into account advancements in science and technology to provide for safe transport of newly developed hazardous materials.

Several specific achievements during FY 1984 were:

- The development of a test procedures manual for the classification of explosives which will help insure correct and uniform classification for transport by the various national authorities.

- The development of design construction and testing standards for metallic and flexible intermediate bulk containers (IBCs). This is the fastest growing form of packaging for dangerous goods, and no internationally acceptable standard for IBCs previously existed.

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- The development of design, construction, and testing standards for tank containers used to transport gases in the cryogenic state; e.g., in the case of helium, the gas will be liquefied and transported in such tanks at a temperature of minus 400 degrees F. (The United States is the leading producer and exporter of helium.)

Taken individually, improvements resulting from international cooperation in these organizations might not be considered major achievements, yet the overall involvement is not only significant in terms of its scope and effect but is essential to the continued viability of the U.S. chemical manufacturers and transporters engaged in international commerce of hazardous materials. Further, a benefit of equal importance is facilitating international transport of hazardous materials through harmonization of transport requirements in various nations and regions of the world as well as those pertaining to different modes of transport. The importance of the facilitating aspects of this work is emphasized by the fact that the United States continues to enjoy a positive trade balance in these chemicals.

Space Transportation

Executive Order 12465, of February 1984, required Federal agencies to encourage and facilitate commercialization of expendable launch vehicles (ELVs) and designated DOT as the lead agency to coordinate implementation of this policy. DOT has established the Office of Commercial Space Transportation, within the immediate Office of the Secretary, to act as a focal point for private sector space launch contacts related to commercial ELV operations. The Office has also provided leadership in the establishment of procedures to expedite the processing of private sector requests to obtain licenses necessary for commercial ELV launches and the establishment and operation of commercial launch ranges.

Subsequently, the President signed the Commercial Space Launch Act which directs DOT to "encourage, facilitate, and promote commercial space launches by the private sector." The statute also requires other Federal agencies to assist DOT in carrying out the Act.

DOT is convinced that the fledgling commercial U.S ELV industry can be economically and technologically competitive with foreign ELVs, including the Western European Ariane and potentially the Japanese N-2 and H-1, the Indian SLV-3, and the Soviet Proton.

Foreign Policy Objectives and Benefits

Safe and efficient national and international transport systems are important to economic development and political stability of all countries. The economy of the world depends upon efforts to develop, maintain, interface, and improve transport systems for the safe movement of people and goods within and between nations. Cooperation is, therefore, a natural result of the realization that sharing transportation technology contributes to the welfare of all.

International cooperation conserves national research resources, expands viewpoints and research approaches, contributes to development of world safety standards, creates new ideas, and increases significantly the possibilities of finding solutions to common problems. The results of bilateral cooperation can stimulate recognition of the need for broader-based multilateral discussions and research. Problems and ideas can sometimes be presented or discussed in multilateral fora which might not be brought up in a bilateral context. Conversely, such discussions often point to a special foreign expertise which can lead to productive, cost-beneficial bilateral activities. Further, participation in international organizations to develop standards for the protection of health, safety, and the environment can ensure that these standards are not just well-disguised non-tariff trade barriers. Such technical activity has a positive effect on international trade by eliminating potential areas of controversy. Technical discussions also protect interests of U.S. industry through considerations of cost-benefits when a proposed regulation, recommendation, or standard does not appear to justify the added cost. Good personal and professional contacts made through participation in international cooperative work are valuable benefits to U.S. cultural and technical relationships. All these results of cooperation in science and technology are important to overall U.S. relations with other countries and consistent with our national interests.

DOT therefore believes that its international activities should be continued and expanded, as resources permit, not only because of the technical benefits but because they are an integral part of U.S. economic and political relationships with other countries.

Budget and Resources

DOT does not have a special appropriation for carrying out international activities. Salaries, travel, research and administrative costs are either (1) borne by the participating DOT entities from domestic program funds or (2) funded through arrangements with other government agencies or reimbursable technical assistance agreements with foreign governments.

DOT maintains small, full-time international staffs in the Office of the Secretary, the U.S. Coast Guard, the Federal Highway Administration, the Maritime Administration, and a somewhat larger staff in the Federal Aviation Administration, whose members provide policy guidance and coordinate and monitor cooperative activities. Some of these staff members, particularly in the modal administrations, perform these functions in addition to their regular operational activities. Senior-level personnel and specialists in the Secretary's Office and modal administrations conduct the important, substantive discussions with foreign counterparts on technical and policy issues. It is estimated that, on an average, these latter activities consume approximately 10-15 percent of the involved DOT staff time.

The Department of State and occasionally other agencies support travel expenses of selected DOT specialists to attend meetings of certain international organizations. AID funds the salaries, travel, and overhead expenses for two full-time professionals and one support staff person to conduct technical assistance studies on particular problems in developing countries. These professionals are assisted from time to time by other DOT staff members as, during 1984, on the African and Caribbean Region studies.

Except where noted, figures on expenditures of U.S. funds for international activities cannot be precisely calculated. DOT believes an adequate portion of its administration and R&D budgets is available for major international cooperation activities commensurate with benefits to be gained and in light of its domestic priorities. The policy of having DOT operating administrations support non-reimbursable international cooperative activities from program funds assures that only activities producing technical benefits will be pursued.

CHAPTER 13 - DEFENSE

The security of the United States and the rest of the Free World depends upon technological superiority over potential adversaries. The strength of our defense establishments and the long-term economic well-being of the Free World community are inextricably linked to technological excellence. This excellence is sustained by concerted efforts to develop and apply advanced technologies and to protect these advances from diversion to our potential enemies.

The United States has long enjoyed worldwide technological superiority and remains the overall world leader in technology. Our success in applying advanced technologies has resulted from incentives for innovation within our free-enterprise system and an effective partnership in research and development among our industries, our universities, and our government laboratories. Our success in protecting these advances from diversion to others results from U.S. licensing and industrial security systems and the cooperation between industry and government. This teamwork has paid tremendous dividends in achieving U.S. technological excellence and in preventing the flow of this precious national asset to our potential enemies.

International Cooperation for Technological Excellence

Our allies are also effecting major advances in both basic and applied technologies. We must go beyond relying on unilateral development of U.S. technologies to that of infusing allied technological advances into our own technological base and persuading our allies and other friendly nations to increase their own fielded conventional capabilities. We must also persuade them to cooperate more fully with us in slowing the flow of Free World technology to the East. This added dimension must focus on both NATO and Japan and provide a balanced exchange of technologies, interoperability between U.S. and allied military systems, and overall advancement of U.S. excellence. By enhancing the industry-to-industry and the government-to-government cooperation in technology with our allies, we improve the efficiency and effectiveness of our defense resources, further our progress in achieving inter-operability, and strengthen the economic and political bases for alliances.

NATO Armaments Cooperation and Defense Trade

The Congress, in the Roth-Glenn-Nunn amendment and the Department of Defense Authorization Act, 1985, has already

recognized the benefits of the Free World's defense posture to be realized through cooperation with our allies in the research, development, production, and fielding of armaments systems.

Ambassador Abshire identified the strengthening of the European conventional force balance as a very serious challenge for the North Atlantic Alliance. A principal element of this effort is the Secretary of Defense's initiative, launched in 1982, to exploit emerging technologies (ET). The ET program was the subject of discussion at both 1984 Conferences of National Armaments Directors and was endorsed again at the December 1984 Defense Planning Committee meeting in Ministerial Session. The intent is to identify discrete programs which will best exploit new technology for significant modernization of conventional forces and give priority to these programs within the nations of the Alliance. We will maximize our support through adequate funding and sharing technology as an inducement to, and commensurate with, the commitment of the allies.

The Department of Defense has an on-going Foreign Weapons Evaluation Program funded at $15 million in FY85. The objective of this program is to evaluate together with the Military Services foreign weapons of NATO origin which are in development or in service and which might be purchased or developed further for inclusion in the U.S. inventory. While this is a small effort, it helps to reduce U.S. R&D costs, accelerate the introducton into service of new systems, promote standardization and interoperability of fielded systems with our allies, and achieve quantity procurement cost advantages.

The Department of Defense in FY84 pursued armaments cooperation with NATO Europe in a number of specific programs. Notable among these are the decision to proceed with four-nation development of a terminally guided warhead for the Multiple Launch Rocket System (MLRS), continued joint development of the AV-8B Harrier aircraft, U.S. Navy purchase of the British Hawk trainer aircraft (which will be produced by U.S. and British firms after adaptation for Navy training requirements), and the development of the Rolling Airframe Missle (RAM) and SEA GNAT ship-defense missile.

Japan

In November 1983, the U.S. exchanged letters with the Government of Japan confirming Japan's agreement "to reciprocate in the exchange of defense-related technologies in order to ensure the effective operation of the Japan-United States security arrangements, by opening a way for the transfer

to the United States...of military technologies." Japan therein committed itself to encourage the transfer of defense-related technologies in addition to military technologies. The Department of Defense has encouraged industrial contacts and on a government-government basis worked in 1984 to facilitate such transfers of technology.

The Defense Science Board (DSB) has completed its reports on industry-to-industry international armaments cooperation with NATO Europe and with Japan. The DSB Japan report, completed in the summer of 1984, calls for a basic restructuring of the U.S. attitude regarding armaments cooperation with Japan and, in particular, endorses closer technological cooperation with Japan, including a two-way flow of technology. In the words of the DSB report, it is vital to U.S. interests that defense and economic ties between the U.S. and Japan endure. The strategic value of such cooperation, the DSB found, outweighs the drawbacks of eventual increased Japanese economic competition.

Other Asian Countries

There has been real progress in armaments cooperation with the Republic of Korea where tank, communications, and missiles programs are helping to strengthen that country's defense capabilities. Progress in assisting the People's Republic of China with their defense modernization continues without threat to U.S. national security or to our Allies and other friends in the Pacific region. Additional cooperative programs with Australia have been negotiated. Agreement on procedures for pursuing a program of defense industrial cooperation was signed with Indonesia this past summer; the Department of Defense is trying to identify projects of mutual interest with that country and with Singapore.

Middle-East

The U.S. will continue its armaments cooperation activities with friendly Middle East nations. Cooperation with Israel, through the 1984 Memorandum of Agreement (MOA), has provided the services with essential information learned during the 1982 conflict in Lebanon. This exchange of information, as well as efforts to co-develop new systems, is expected to continue. Several co-production programs with Egypt operate under the U.S. Defense Production Assistance Agreement (DPAA). This agreement has been amended to provide data exchanges which should further cooperative efforts. An agreement on Defense Industrial Cooperation has been signed with Pakistan.

Latin America

Cooperation with friendly countries in Latin America continues to improve in accordance with the needs and capabilities of the individual countries. A Memorandum of Understanding (MOU) on military industrial cooperation, as well as an Air Force scientist and engineer exchange program, has been concluded with Brazil. DOD is also assisting in the development of a regional cooperative program for the indigenous production of low technology material. In addition, arrangements are being made for exploratory discussions with Mexico on establishing long-term cooperative programs in military technology.

Challenges and Opportunities

To regain military capabilities diminished during the 1970's in land, sea, air and space systems capabilities, it is imperative that the United States work with friendly governments and allies to commit increased resources toward improving manpower skills, technological advancements, and budgetary allocations. Each country must assume a more equitable share of the overall defense burden. We anticipate that participation in armaments cooperation programs could lead to increased contributions to the common defense. In addition, involvement in industrial arrangements should result in more work for these industries, less unemployment, and more defense equipment for financial resources expended.

We must look to international cooperation in the research, development and production of armaments as a means of strengthening the security and economic base of the Free World. Through partnership with our allies we can build better systems. With greater standarization and common procurements we can enhance economies of scale, lower procurement costs, and strengthen the interoperable character of our forces.

DOD currently has reciprocal memoranda of understanding with NATO allies to lessen, if not remove barriers to defense trade. Renewal of these agreements will begin in 1985, and the DOD expects in this process to transition these bilateral agreements into a U.S.-NATO Europe agreement. This is a step toward desired integration of the European defense market. Western security and technology cooperation in armaments within NATO will be greatly helped if Europe is able to organize defense research, development and production on a scale more comparable to the scale of the U.S. market. Through the Independent European Program Group in NATO and the Western European Union, important work toward this objective is already under way. With Japan, the U.S. must continue efforts to develop a facile two-way flow of technology.

We must recognize that most of the international cooperation -- with NATO, Japan, and others -- will be carried out on an industry-to-industry basis. We need to establish a government-to-government environment that encourages such technology cooperation and resists protectionist or trade restrictionist attitudes.

The Administration will need to work with the Congress and with U.S. industry, as well as with our allies, to develop effective technology programs to our economic and security benefit.

CHAPTER 14 - SCIENCE AND TECHNOLOGY FOR DEVELOPMENT

Organization of USAID for Science and Technology

Since 1981 the overall organization of the Agency for International Development (AID) has been revamped to strengthen the scientific and technical component in policy and programs. The new organization has been described in the Title V reports of the past two years. That structure remains valid.

Collaboration with the U.S. Scientific Community

Progress has been made to strengthen the Agency's technical resources through closer collaboration with the U.S. scientific community. An important mechanism for this collaboration is the Memorandum of Understanding (MOU), a long-term agreement between AID and one or more universities for cooperation in areas of high priority to AID. In return for a commitment by AID to provide resources, the university guarantees to make available for long-term assignments a specified number of faculty in certain fields. To date, five MOUs have been signed with single universities (Colorado State, University of Florida, Purdue, Utah State University, and Washington State University). In addition, FY 84 saw the signing of two "joint MOUs," where the university signatory is a partnership of a land-grant institution and a historically black college or university. Joint MOUs have been signed with Oregon State and Tuskegee Institute and with Michigan State and North Carolina A&T. Reflecting the fact that the preponderance of the Agency's projects are in Africa, the MOUs so far address primarily African food production, drawing on the universities' expertise in such areas as irrigation, dryland farming, and water management.

FY 84 saw a further strengthening of science and technology in USAID missions abroad. Under the Joint Career Corps (JCC), 16 faculty members from U.S. universities assumed positions of responsibility in 10 missions. Two of those assigned to Cairo and Bangkok are concerned entirely with science and technology. As science advisors to the missions (in the case of Bangkok, to the U.S. Embassy as well), these individuals play a catalytic role in the development of overall science and technology strategies for AID in the host country. A similar assignment is planned for New Delhi.

In addition to these three assignments, many other JCC positions provide expertise to requesting missions in such sectors as health, population, and agriculture. A total of 25 JCC positions has been authorized. Several candidates have been identified for the remaining nine vacancies and recruitment continues.

As part of an effort to keep the technical expertise of the Agency's full time direct-hire staff up-to-date, AID has developed a program of "reverse JCCs." This mechanism allows AID staff members to spend approximately a year of teaching and research in an area of high priority for development at a U.S. university. It is intended that this experience will stimulate greater interest at the host university in development issues, as well as provide the AID staff member with new insights for future assignments. To date, three "reverse JCCs" are in place.

A study is currently underway of potential areas for increased cooperation between AID and the National Science Foundation (NSF). NSF already assists AID with access to scientists who can serve on peer review panels for research proposals submitted to AID for funding. The study will identify areas where NSF-funded, U.S.-based research has applications to developing country needs. This may reveal opportunities for related research work in LDCs or by LDC scientists. Such cooperation between the two agencies would broaden the framework of U.S. scientific effort and accelerate the pace of technology development and transfer for LDC needs.

Significant Program Initiatives and Achievements in FY 84

Agriculture

In agriculture, AID employs a variety of mechanisms to stimulate and support research on LDC problems and to strengthen indigenous LDC capacity in science and technology. Among the mechanisms are international agricultural research centers, the collaborative research support programs (CRSPs), and AID projects designed as international or regional research networks.

The following are illustrative research accomplishments in FY 84.

Host Resistance/Integrated Tick Control

Tick infestation is a major obstacle to livestock production in Africa. Large numbers of cattle die from diseases transmitted by ticks, with the remaining cattle debilitated by the tick infestation itself. Researchers at The International Center for Insect Physiology and Ecology (ICIPE) working under AID sponsorship, are uncovering the biological processes which make certain groups of cattle immune to tick infestations. New findings on pest-generated host resistance means that efficient biological tick control programs may now begin to move from the laboratory to the field and may prove to be an efficient method for reducing tick populations and for controlling some of the most devastating cattle diseases in Africa.

Small Ruminant CRSP

The Collaborative Research Support Program (CRSP) brings together U.S. and LDC scientists to work on problems of crops important to the poor in developing countries. Among the crops under study are sorghum and millet, peanuts, beans and cowpeas.

In livestock, it is the small ruminants, sheep and goats, that are of greatest economic importance to the poor segment of the population. An AID-sponsored Small Ruminants CRSP project on integrated goat production in Northern Peru was so successful that it attracted additional funds from the Canadian International Development Research Center (IDRC). In the highlands of Southern Peru modern equipment has been put into operation for fiber grading which results in higher returns to the farmers for animal fibers. In Kenya, the CRSP project identified and successfully eradicated a goat disease called Caprine Arthritis Encephalitis (CAE). This work has stimulated the development of CAE-free goat herds in the U.S. Researchers from the CRSP and several Kenyan agencies have collaborated in the development of a comprehensive computer simulated model which examines sheep and goat production in a broad range of environments. In Morocco and Indonesia, work is proceeding on identifying and isolating prolific sheep genes for use in improving sheep production in these two countries. In Brazil, the International Atomic Energy Agency has provided equipment to the laboratory of the National Goat Research Center for use in Small Ruminant CRSP research studies. In addition, CRSP scientists studying the sheep and goats in Peru are also beneficiaries of support from the International Atomic Energy Agency.

New Initiatives in Agriculture

Several program initiatives taken in FY 84 promise important payoffs in increased agricultural production in LDCs in the future.

The Honduras Agricultural Research Foundation

When the United Brands Co. closed down its world-renowned banana and plantain research facility in Honduras in 1983, it offered to donate the facility to a private organization. AID and the Government of Honduras concluded that an independent, private research foundation headquartered at the donated facility was the most effective way to continue the research programs. Thus, the Honduras Agricultural Research Foundation was established in 1984 with a $20 million, 10-year grant. The Foundation is private, governed by a board of directors from private and public sectors in Honduras and internationally. A

principal focus of the research program will be non-traditional crops. International networking will be another important feature of the Foundation. While the banana breeding program will require continuous basic research, efforts will be coordinated and shared with other producing countries and closely linked with a proposed International Banana and Plantain Network. Two regional network centers will be located in Africa and one each in Costa Rica and Southeast Asia. The Foundation will serve the network as the leading-country banana research center of excellence. In addition to its support to the Foundation, AID, through its Central American Regional Program (ROCAP), plans to support the Latin American Regional Banana and Plantain Research Network.

New International Soils Agency: IBSRAM

The International Board for Soil Research and Management (IBSRAM) was established in September 1983. IBSRAM is an autonomous, charitable, non-profit, educational, research and philantrophic international agency. It will provide assistance to national agricultural development and soil research programs through promotion of appropriate soil research and improved management methods to serve needs of farmers in developing countries. The goal is to increase food production by tackling, primarily at the farm level, some of the soil constraints which now prevent improved crop varieties from attaining their yield potential in the tropics.

Potential IBSRAM supporters include the development assistance agencies of Australia, FRG, Canada, France, and the U. S. AID has agreed to co-sponsor four IBSRAM workshops and, in addition, has provided $50,000 towards IBSRAM core funding during FY 84 and plans to provide $50,000 during FY 85.

Agricultural Policy Analysis Project

In 1984 AID initiated a new project to assist developing countries analyze and develop effective agricultural policies for development. The following are two examples of work carried out by this new project.

A major review of agricultural policies in Senegal was conducted. This study critically reviewed the feasibility of continued heavy government intervention in the agricultural sector and pursuance of food self-sufficiency policies. It lays out possible policy alternatives and is anticipated to form the basis for AID agricultural assistance programs in Senegal over the next five years.

In Mauritania, the impact on domestic consumption of rice price changes instituted under PL 480 was examined. It was concluded that the changes in question would have minimal impact on domestic consumption of basic grains.

Assistance in analyzing policies that affect the performance of the agricultural sector has also been provided to Peru, El Salvador, Dominican Republic, Niger, Zaire, Pakistan, and Thailand.

International Irrigation Management Institute (IIMI)

IIMI is a recently-created international center focusing on research, training, education and information transfer related to the management and performance of irrigation systems. It is patterned after the International Agricultural Research Centers but is not a part of the Consultative Group. Rather, it has been conceived and created under an "IIMI Support Group" of interested donors, including AID. The Institute is headquartered in Kandy, Sri Lanka, but eventually will comprise a network of participating units located in other countries where irrigation management is a serious problem and where opportunities exist for carrying out research and/or training activities. The Institute plans to become fully operational in early 1985. AID will provide $200,000 toward the core funding for IIMI in FY 1985.

Agrobiotechnology with IARCs

An international seminar on biotechnology was held at the International Rice Research Institute (IRRI) in 1984 to determine the role that the newer biotechnology-based molecular biology can play in research at the International Agricultural Research Centers (IARCs). Those centers working with crops are using embryo tissue culture to produce pathogen-free germ plasm, monoclonal antibodies to distinguish between strains of diseases, and somaclonal variation with plant tissue culture to develop lines more tolerant of environmental stresses and certain diseases. These new biotechnology methods are being researched and used by the International Agricultural Research Centers and by national programs, especially in Asia. These techniques promise rapid progress in solving very difficult problems, such as adapting crops to salt-laden soils, and diagnosis or control of serious animal and plant pests. AID's agrobiotechnology projects in plant tissue culture at Colorado State University and biological nitrogen fixation at the University of Hawaii and other U.S. institutions have developed close working relationships with IARCs to exchange and test new materials.

Breakthrough in Central American Bean Production

Thanks to a new disease-resistant bean line introduced by the International Center for Tropical Agriculture (CIAT), farmers in Central America who had become discouraged with growing beans are now returning to this crop. Beans are an important source of protein in the basic diet in Central America and the Caribbean, especially in lower-income, rural communities, where the average person eats more than 50 grams of beans per day. However, traditional seed varieties have been highly susceptible to Bean Golden Mosaic Virus which decimates the crop. Only by frequent applications of pesticides, which the small farmer could not afford, could adequate yields be maintained. The new resistant dorado bean lines, introduced by CIAT, produce with no chemical inputs yields equivalent to what the traditional varieties produce with five insecticide applications. If farmers do provide chemical protection, the dorado outyields the traditional variety by 60 percent. Developed at a CIAT-affiliated center in Guatemala, the dorado bean lines have been quickly accepted by farmers, large and small, and Guatemala has apparently become self-sufficient in bean production. The lines also have a high degree of transferability and are now being planted in other countries such as Mexico, Argentina, Haiti, and Dominican Republic. In addition to providing about 25% of CIAT's core budget, AID also provides bilateral funding for the Guatemala center's work on this project.

Farming Systems

The Farming Systems Support Project, begun in 1984, has made major progress in raising the level of awareness and interest in the Farming Systems approach to research and technology transfer.

In Paraguay, the project has increased collaboration between Paraguayan research and extension organizations doing on-farm adaptive research. A West Africa regional workshop in the Gambia provided an orientation of the farming systems approach to 30 participants from six countries in the region and a forum for discussing the approach in West Africa. A Training-of-Trainers Workshop trained 25 West African experts to serve national research and extension programs as trainers in the farming systems approach. A workshop on Sorghum and Millet in Latin American Farming Systems provided an opportunity for heads of sorghum and millet programs and national agricultural research directors from throughout Latin America and the Caribbean to discuss their country research experiences with each other and with representatives of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). The workshop strengthened networking among researchers concerned with sorghum and millet production in Latin America, the Caribbean, and West Africa.

Near East Dryland Network

A comprehensive research and training network effectively linking national scientists within a region to U.S. scientists, [AID-funded U.S.-based research programs] IARCs, and regional research organizations would be a major impetus in solving dryland agricultural problems. As a prototype, AID is developing a regional dryland research network for the Near East region. USDA/AID scientists are involved in discussion with scientists from the University of Nebraska, Oregon State University, the International Center for Agricultural Research in the Dry Areas (ICARDA), and LDCs. A workshop on the subject was held in Tunisia in summer of 1984 and another is planned in the region for spring of 1985.

Agricultural Projects in Specific Country Programs

Egypt Rice Research and Training Project

The goal of this project is to improve the social and economic condition of the small rice farmer and increase the quantity and quality of food supplies. Extensive varietal trials and on-farm production demonstrations have been completed and rice yields from project demonstrations have been 50% higher than the national average. The breeding program, which has made outstanding progress towards developing high-yield varieties, has been accelerated by coordinating closely with IRRI staff and utilizing IRRI facilities in the Philippines.

Egypt Major Cereals Improvement Project

This project provides new information and knowledge for increased cereal grain, legume, and forage production by improving research and extension capabilities. Project research results indicate that large yield increases, 60 to 80% above the national average, are agronomically feasible and clearly attainable. Research in the legume area indicates that national yields in lentils and soybeans can be increased by 50% and 40% respectively.

Health

Malaria Vaccine

Malaria is one of the most widespread diseases and, in some countries, the primary public health problem.

In 1966, AID initiated a research project to determine whether a vaccine against malaria was possible. Research showed that a vaccine was possible, and AID followed up with a major effort in malaria immunity and vaccine development. The

project is now funded at $7-8 million per year. AID has established a highly integrated research network of 18 institutions in the United States and abroad. This research utilizes the most current biotechnical approaches -- for example, monoclonal antibodies and genetic engineering. Several major breakthroughs during 1984 will affect not only the development of a practical vaccine, but also the effectiveness of current malaria control programs. For example, two researchers from New York University have demonstrated through genetic engineering technology the capability to produce a vaccine against the most deadly form of malaria in human beings. AID will be organizing three regional conferences to determine sites and research protocols for field tests of prototype vaccines which should begin within the next 18-24 months.

Vaccine Development

One of AID's top priorities is to help developing countries lower the health barriers to social and economic development. To this end, AID has adopted a primary health care (PHC) strategy to reduce child mortality and control disease among the labor force and women of reproductive age.

The development of new or improved vaccines is a critical part of any primary health care strategy. Some vaccines, such as tetanus toxoid, are fully applicable today in developing country situations and are among the most cost-effective methods of any PHC strategy. Other vaccines, such as measles, are useful but inadequate in their present form. Although the application of modern biotechnology holds considerable promise, there are presently very few vaccines available to prevent the major causes of childhood illness and death. To produce and then apply vaccines through primary health care programs, health officials in developing countries will require access to new technology emerging from research programs in the United States.

In late September, 1984, AID signed a PASA with the United States Public Health Service to develop new and improved vaccines to reduce the incidence of preventable diseases in developing countries. The first two vaccines tested under this program are (1) an aerosolized measles vaccine, developed by Dr. Albert Sabin, which is expected to protect children as young as six months, and (2) a vaccine against rotavirus diarrhea, the single most common cause of serious diarrhea in infants in most parts of the world.

Oral Rehydration Therapy (ORT) and Diarrheal Disease

ORT has been described as "...potentially the most important medical advance of this century" by a leading British medical journal, Lancet. It is widely recognized as one of the most important and dramatic of the low-cost techniques for improving childhood survival. For example, diarrhea-caused deaths have been reduced by half in project sites in Honduras, Guatemala, and Egypt after strong ORT programs. Because of this demonstrated record, ORT is one of the principal technologies AID promotes in health programs worldwide.

Today, AID supports ORT activities in over 50 countries. New bilateral ORT programs are underway in such countries as Uganda, Senegal, Indonesia, and in the Central American Region. In the past year, ORT has become one of the fastest growing AID technical programs. Agency expenditures for ORT have increased during this period from $12.7 million in 1983 to approximately $22 million in 1984.

AID is also working at the community level. In February 1984, AID and Peace Corps signed a two-year collaborative agreement on ORT. This agreement provides funds for Peace Corps to train volunteers in the proper use of ORT and overall diarrheal disease management at the village level. In addition, the Agency has expanded its Mass Media and Health Practices project, which educates mothers on the proper use of ORT, to four new country sites and plans further expansion of this highly successful program. Plans for regional conferences in Africa and Asia focusing on ORT implementation strategies are underway, and the Agency is currently working with UNICEF, UNDP, WHO, and other international agencies on a second International Conference on Oral Rehydration Therapy in November 1985.

Part of AID's technical assistance goes to help countries overcome practical problems with delivering ORT. For example, the Egyptian National Oral Rehydration Program ran into difficulties when it was discovered that Egytian homes do not usually have the one-liter containers necessary for mixing the standard-sized packets with water. The most common containers encountered were 200 milligrams. They also found the standard packets so difficult to open that invariably salts spilled outside the container. Studies were carried out which determined that the volume of solution needed to rehydrate a child had been overestimated. These problems prompted a redesign of the packet. Not only was it made smaller to adjust to local container size and reduce the amount of solution in keeping with the child's needs, but the salts were packaged in a thinner material so it was easier to open.

Effective as it is, ORT is no panacea. AID continues its longstanding support for diarrheal disease research. During FY 84 the Agency provided $1.9 million to the International Center for Diarrheal Disease Research in Bangladesh and is currently developing a five-year project to increase, redirect and better coordinate current AID support for research on the prevention and control of diarrheal diseases. In addition, AID approved a $3 million, three-year grant to the International Center of Infant Nutrition and Gastrointestinal Diseases of the Children's Hospital of Buffalo, New York. The Center will train LDC pediatricians to conduct research on chronic diarrheal diseases.

Water and Sanitation

In 1980 it was estimated that three out of five people in the developing world did not have easy access to safe drinking water, and three out of every four had no sanitary facilities -- not even a simple pit latrine. Improvements in domestic water supply and basic sanitation can help substantially to improve health, particularly in conjunction with primary health care. However, training of field personnel had been hampered by lack of well-designed training materials at reasonable cost. This year, AID developed four training guides for use in rural water supply and sanitation projects. The guides deal with four readily applicable technologies: latrine construction, handpump installation and maintenance, rainwater roof catchment, and spring capping.

Strengthening LDC Indigenous Capacity in Health Technology

Another focus of the AID S&T program is to build the capacity of developing countries to produce technologies to meet their needs. In the Philippines, AID has funded a study of potential opportunities for AID-funded biomedical research. Depending on the outcome of this study, a decision will be made whether or not to proceed with the development of a bilateral biomedical research project. In Indonesia, a study to determine the feasibility of local vaccine production has recently been completed. This will provide the basis for a joint GOI/AID decision regarding assistance to develop a local production capability. In India, AID is financing a study of the determinants of low birth weight, one of the leading causes of high infant mortality. This study examines the role of both maternal infections and nutritional status during pregnancy to identify program interventions which could address this problem.

Population

NORPLANT[R] Contraceptive Subdermal Implants

NORPLANT[R] contraceptive subdermal implants were approved by the Finnish National Board of Health in November 1983. Leiras Pharmaceuticals, the Finnish manufacturer, is now able to initiate large-scale production for public and private sector distribution. AID has been supporting clinical trials at three sites in the U. S. Filing for approval by the U.S. Food and Drug Administration is scheduled for mid-1985. In addition, AID will begin to support clinical trials internationally through the Population Council and Family Health International in preparation for regulatory filing in numerous countries over the next three to four years.

NORPLANT[R] subdermal implants are a long-acting, low-dose progestin-only contraceptive for women. The implants, which are placed under the skin of the upper arm, protect against pregnancy for more than five years. In almost ten years of clinical experience, the contraceptive effectiveness and continuation rates have proved equal or superior to all other reversible methods of contraception. The implants can be removed at any time and normal fertility will be immediately restored. NORPLANT[R] implants have been under development for 17 years by the International Committee for Contraception Research of the Population Council in New York and represent the first significantly new technology in contraception in over a decade.

Energy

Substituting Coal for Imported Oil

AID increased its efforts to help developing countries use indigenous coal resources as a substitute for imported oil. A promising approach is the substitution of coal-water mixtures for oil to fuel electric power generating stations. The feasibility of this approach is being pursued in the Philippines under AID sponsorship. Testing of Philippine coals is underway and plans are being developed for retrofitting a large Philippine steam generator. This new approach is under advanced development in the U.S., including the emergence of a fuel preparation industry. Prospective benefits to the Philippines could be up to a $500-million annual savings in foreign exchange.

Energy Efficiency

Significantly improved energy use is possible in major sectors of LDC economies -- especially in the industrial and power-generating sectors. AID is increasing its technical assistance to developing countries, including Sri Lanka, Pakistan, Costa Rica, and the Philippines, to increase the energy efficiency of their industrial sector and to examine other areas, such as transportation, where increased efficiency might also be realized.

Jamaica Cane Energy Assessment

AID has completed a study of the technical and economic potential for large-scale electricity production from the Jamaican sugar cane industry. This assessment focuses on intensive cane cultivation practices, based largely on DOE-sponsored "energy cane" research in Puerto Rico, improved sugar factory operations, and construction of a modern, integrated power plant linked to the national electricity grid. Results of the study indicate strong economic returns to Jamaica, considerable foreign exchange savings from reduced oil imports, and the potential to revitalize the country's largest agricultural industry. A pilot project to demonstrate the approach in Jamaica is planned. Given the economic status of sugar cane in a great many developing countries, the implications of the cane energy approach are great.

The Tunisia Renewable Energy Project

A 29 kilowatts-peak photovoltaic (PV) power system in Hammam Biadha Sud, 93 miles southwest of Tunis, has been completed. This system provides the basic electrical needs of 120 village inhabitants as well as those of the 450 children who attend the Hammam Biadha school. Additionally, there are three separate 1.5 kWp PV systems that provide electricity for a farmhouse, water pumps for irrigation of greenhouse-grown vegetables, and a fruit tree orchard. Two windmill-driven pumps will supply water for crop irrigation and a small solar heating system will provide hot water for the village clinic. Three greenhouses and the solar hot water system were specially designed for the Hammam Biadha locale to use only locally available materials.

Renewable Energy Program Assessment

AID and other donors are at a critical juncture with respect to renewable energy. The Tunisian project cited

above is an example of the approach used heretofore which stressed the engineering and technology aspects of renewables as part of a technical demonstration approach. In order to increase the impact of the Agency's work in renewable energy, AID initiated an assessment of its renewable program efforts with the following new objectives: (1) to assess priority applications of renewable energy technologies with emphasis on productive uses in agriculture and rural industry; (2) to develop those renewable systems which, when compared with alternatives, are the least-cost site specific solutions to supply energy needs; and (3) to develop local private sector capability to market, manufacture, and maintain the most promising renewable energy systems.

Forestry, Environment and Natural Resources

Biological Diversity Task Force

AID served as lead agency for the Interagency Task Force which prepared a U.S. Strategy Report on the conservation of biological diversity in developing countries. The report will be submitted to Congress in 1985. It contains options for a strategy and actions which would permit conservation of biological species while, at the same time, furthering economic development in the Third World.

Environmental and Natural Resources Planning

Since 1977, AID has sponsored the preparation of developing country environmental profiles (CEP). Phase I of these profiles (desk studies) have been produced for most countries with AID programs. More comprehensive Phase II profiles (field studies) have been prepared for 12 countries, often with the lead participation of the host country. To further encourage natural resource planning, AID is suggesting acceleration of the preparation of Phase II CEPs, Natural Resources Sector Assessments, Natural Resources Strategies and similar analyses. AID Missions have been instructed to identify funding for these studies and to work with host countries to incorporate significant findings of these analyses in their future project portfolios.

In FY 1984, AID allocated funds for central program support ($750,000 over three years) to assist in the planning and organization of these country-level activities. In addition, analytical and syntheses work was initiated to build on past experience in implementing country environmental profiles to comprise the design and methodology of such activities in the future.

Asia Forestry Research Network

Research to ensure sustainable supplies of fuelwood and building material is an urgent priority in most regions of the world. AID took initial steps during FY 84 to establish a forestry research network among less-developed countries in Asia. This project will strengthen and advance multipurpose tree species research within and among Asian research institutions.

U.S.-Morocco Winter Snowpack Augmentation Project

The Government of Morocco signed an agreement with AID May 22, 1984, in which the Bureau of Reclamation will participate in a cooperative winter cloud-seeding demonstration project in the Atlas Mountains. This project will assist the Government of Morocco to develop, design, implement, monitor and evaluate weather modification programs as an integral part of the overall management of water resources in Morocco. The U.S.G is providing technical assistance only; the actual operations will be conducted by the Moroccans. The utmost safety precautions have been built into this project. The Bureau of Reclamation is providing a Resident Scientific Advisor to the Moroccan National Meteorological Organization for the life of the project (5 years) and short-term technical experts as needed. The total cost of the project is estimated at $12.9 million, of which $6 million (47.9 percent) will be contributed by AID.

Program for Scientific and Technological Cooperation (PSTC)

This program continues to be implemented primarily through an AID-administered competitive grants program, and through research networks managed by the National Academy of Sciences.

Competitive Research Grants Program

In 1984, 58 grants were made by the competitive research grants program, more than two-thirds of which were awarded to developing country scientists. These grants focus on "cutting edge" areas of science, such as biotechnology, chemistry applied to agriculture, and biological control of disease vectors. Although the first research grants in this program were signed only in August 1981, some useful research results have already appeared.

A study of adobe construction techniques, carried out by the Catholic University in Lima, Peru, has shown how to assure the strength of earthen structures through proper selection of soils and additives and proper mortaring and curing of the materials. The success of this project has prompted the Office of U.S. Foreign Disaster Assistance to fund a follow-up study. A new structural material suitable for housing has been developed in a cooperative project between the Honduran National School of Forest Science and the University of Idaho. The panels are composed of wood particles held together by cement and inexpensive inorganic additives. Researchers are publishing their findings and beginning economic feasibility studies for enterprises to manufacture the panels.

University of Florida experiments to reestablish benthic sea grasses in pollution-denuded areas of Jamaica have been so successful that the AID Mission in Jamaica has funded a follow-on project, two other missions are considering similar projects, and the UNEP is publicizing the success world wide. Similarly, a National Institute of Health demonstration project improving biomedical equipment maintenance and repair, has led to a much larger follow-on project funded by AID's Latin American Bureau. The Missouri Botanical Garden's study of plants in a valley on the Eastern slopes of the Andes has identified several species with significant economic potential, and USAID Missions in Peru and Ecuador have funded follow-on projects.

NAS Research Network Program

In FY 1984, the National Academy of Sciences (NAS) made 39 subgrants to developing country institutes. Projects were funded in each of six research networks, three of which deal with agricultural topics and three with biomedical. Again, although the first subgrant was made only in 1982, some results have already appeared.

A monograph has been published on Amaranth, identifying the potential of this ancient, high protein content grain for modern agriculture. Researchers in Cuzco, Peru have developed a high-yielding variety which is being introduced to the highland farmers in Peru. A new newsletter facilitates communication among the growing cadre of amaranth researchers. Grain amaranth has been introduced in Africa, and researchers in Thailand who believed they were introducing the crop in their country were surprised to find it grown by traditional groups in the mountains.

Two monographs have been published and widely distributed, dealing respectively with Leucaena and Casuarina -- fast-growing trees with considerable potential for developing countries. Each was based on extensive surveys of scientists and summarizes their views on the uses and management of the most important species and cultivars of these trees. Research needs are stressed, and contacts in developing and developed countries are identified. These studies are part of a continuing series on fuelwood species and are closely related to the NAS-managed research network on fast growing trees.

In the area of biological nitrogen fixation, Pakistani researchers have demonstrated that a system based on Kaller grass can be used to turn saline wasteland into productive pasture. Not only do the soil microorganisms symbiotic with Kaller grass fix nitrogen, enriching the soil, but the grass itself appears to move the salt out of the soil, encouraging the hope that more productive crops can be grown in rotation with Kaller grass in previously saline soils.

S&T Initiatives in Country Programs

Thailand S&T Project

Following the signing in April 1984 of an umbrella S&T agreement by the foreign minister of Thailand and Secretary Shultz, AID began designing an S&T strategy and program. Even before the umbrella agreement had been signed, the AID Mission in Bangkok recruited a science advisor who is well known in the U.S. in both academic and private business circles. During the past ten months the AID Mission in Bangkok has been investigating the potential of a major S&T for development program with a number of Thai private and public sector leaders, and has commissioned a number of studies in the S&T field by respected Thai and American consultants.

It is expected that a project proposal will be completed by spring 1985. Several preliminary decisions have already been made for the design of a project. The project would include components in research and development, industrial and investment support, and the private sector. AID is also discussing strengthening science and engineering capacities in Thailand through this project.

Although the project remains to be fully developed, the Thai Government, as well as elements of the Thai private sector, shows enthusiastic interest in science and technology development as an essential part of national efforts to continue the successful transformation of Thai society.

Egypt S&T Strategy

In spring 1984, an outside panel completed an assessment of Egyptian science and technology and AID assistance. Following up that assessment, USAID Cairo developed a strategy to sharpen the focus of what had become a very diverse program. The present strategy calls for a shift from broad-based capacity building to focusing on a limited number of priority development problems. This new direction emphasizes the involvement of end users in identifying needs and design of projects which cut across disciplinary lines. A crucial element is to increase Egyptian responsibility for administration and management.

Under this strategy three new priority areas were identified: critical childhood diseases, land use planning, and energy. In addition, the priority of three ongoing sectoral areas was reaffirmed: productivity improvement in private/public enterprise, agriculture, and water/wastewater management.

This new strategy is under discussion with Egyptian Government officials.

Indian Research and Technology Development

In FY 1984, as part of a ten-year strategy, initial steps were taken to designate an increasing portion of the USAID development assistance portfolio to research and technology development. Several senior scientific experts, recruited through the Joint Career Corps mechanism, have taken assignments in India. They are working with Indian government officials to establish the groundwork for an ongoing substantive dialogue on scientific issues. The Mission is exploring possibilities for program expansion with several GOI entities, including the Department of Science and Technology and the Indian Council for Agricultural Research.

Indo-U.S. Science and Technology Initiative

Research projects under this initiative, launched in October 1983, are progressing well with exchanges of scientists, data, and materials. An evaluation panel assembled by the National Academy of Sciences will be making recommendations early in 1985 on the future course of projects beyond the two-year time frame originally envisioned (through October 1985). Many projects appear to have sufficient promise and potential to merit being continued. In some cases, the nature of the work would change -- for example, once basic laboratory reseach has been completed, emphasis would shift to field validation.

Agency Budget and Personnel Resources for Science and Technology

In FY 84, AID obligated a total of $384 million for science and technology activities worldwide, out of a development assistance budget of $1.4 billion. Centrally funded science and technology activities accounted for $102 million of the total.

Precise numbers of Agency staff involved in science and technology are hard to determine since individual assignments and unit responsibilities change. Staff members move in and out of technical functions. Moreover, as noted elsewhere in this chapter, the Agency draws extensively on consultants from the entire U.S. scientific community for expertise in specific technical disciplines. As a rough estimate, however, about one-quarter of the Agency's approximately 3400 U.S. direct-hire employees are qualified to serve in scientific or technical positions.

U.S. Foreign Policy Benefits

The U.S. is fortunate in having a large proportion of the best scientific resources in the world, both in human talent and in facilities. By marshalling these resources to address the urgent problems of developing countries, the U.S. provides assistance that will prove far more valuable in the long term than the dollar costs would suggest. Improved technologies enabling developing countries to manage better their natural resources, to increase food production using available resources, to improve health care, and to control population growth are examples of how development assistance can, over the long term, mitigate the need for emergency disaster relief.

LDCs recognize the importance of strengthening their own capacity to generate and adapt technologies to solve the problems of economic development and have demanded assistance in science and technology infrastructure-building from developed countries. AID's program, combining U.S.-based research, cooperative research between U.S. and LDC institutions, and research networks linking entities in several developing countries, encourages LDCs to take an active role in overcoming constraints to development. Research linkages use and strengthen each institution's comparative advantage and capacity, while advancing human knowledge in high-priority problem areas. Participating countries at varying stages of scientific development can contribute to an international effort as well as reap benefits from it.

Projects of scientific research and development and adaptation of technology afford a vehicle for cooperation and communication between and among countries which can transcend political differences. Working toward a common scientific goal can help countries recognize other shared interests. The following is an example of mutual benefits from this kind of cooperation:

Egypt-Israel Regional Agricultural Program

As part of its Regional Cooperation Program supporting the Middle East Peace process, AID has agreed to provide $2,526,000 for the first two stages (years 1 through 3) of the 4-year proposal entitled, "Patterns of Agricultural Technology Exchange and Cooperation in Similar Ecosystems: the Case of Egypt and Israel." Participating organizations in Egypt and Israel are expected to contribute in kind approximately $725,000 to this project over 3 years. Benefits for American agriculture are possible in the field of extension and adaptation of arid and semi-arid farming techniques. Similar benefits are likely to accrue to Egyptian and Israeli research-teaching-extension institutes, as well as the scientific and cooperative progress resulting from increased interaction between the two countries.

Although AID-supported science and technology activities address constraints felt most urgently in developing countries, the results of AID-funded research can benefit the U.S. domestically as well. The benefits of higher yielding, more disease-resistant crop varieties are obvious. In addition, new crops that thrive under adverse conditions can open up new economic opportunities for U.S. agriculture. Only a few examples will be cited here:

Bean/Cowpea CRSP

Five improved multiple disease-resistant lines of dry beans were released in 1984 from work by the Bean/Cowpea CRSP involving the University of Puerto Rico, the Dominican Republic Ministry of Agriculture, the Escuela Agricola Panamericana in Honduras and the USDA Tropical Agricultural Research Center. These research efforts were organized to address the problems of bean yield losses associated with high disease susceptibility among the bean varieties popular in the region. These lines will be used to increase disease resistance and reduce genetic vulnerability of beans grown in the U.S. Of major significance is the multiple disease resistance of these lines. Its importance to both the U.S. bean industry and developing countries could be compared to the improved IRRI rice varieties that started the Green Revolution. The economic value of this germplasm to the U.S. bean industry alone will be worth many times the contribution by AID to support the project. Its value to developing countries is immeasurable.

New Crops

AID-funded research has also identified new crops of possible economic value to U.S. as well as LDC farmers, such as jojoba, guayule, and amaranth. During 1984, AID-supported researchers from the U.S. and developing countries met to discuss their work at the Third Amaranth Conference in Pennsylvania. They were able to brief American farmers who are attempting to introduce the crop commercially in the U.S. and to provide them with information on the most recent research results.

Overall, the ability to increase the tolerance of crops to salinity, drought, and aluminum toxicity could help U.S. farmers sustain productivity in the American Southwest. Likewise, new or improved vaccines, whether or not the diseases are prevalent in the U.S., will reduce the risk for Americans in an age of global travel, and technologies which increase the alternatives to fossil fuels can help to keep energy prices stable and help maintain U.S. energy security. Advances in the protection and management of LDC natural resources will help ensure a sustainable resource base worldwide for future generations.

Increased productivity, leading to a higher standard of living, improves the chances for political stability and creates the economic climate for stronger participation in world trade.

CHAPTER 15 - BASIC SCIENCE AND ENGINEERING

The National Science Foundation (NSF) is an independent federal agency established by the National Science Foundation Act of 1950 (P.L. 81-507) to promote and advance scientific progress in the United States. The concept of a National Science Foundation was an outgrowth of the important contributions made by science and technology during the Second World War. Since its establishment in 1950, NSF has occupied a unique place among federal government agencies, with responsibility for the overall health of science and engineering across all disciplines, in contrast to other agencies that support research directed to specific missions.

Consequently, this chapter focuses on the NSF as the major source of support for international activities across all disciplines.

NSF International Activities

The National Science Foundation Act of 1950 (Public Law 81-507, 64 Stat. 149) assigned to the Foundation broad responsibility for encouraging participation of U.S. scientists and engineers in international activities. The Act also grants authority to the NSF Director to engage in science and engineering negotiations with foreign countries and multilateral bodies, consistent with U.S. foreign policy, as defined by the President, the Secretary of State, and the Congress.

In May 1984, the National Science Board (the policy-making arm of NSF), by endorsing a report of its Committee on International Science, reaffirmed the importance of international cooperation to the basic mission of the Foundation and resolved that NSF should seek ways to work closely with the Executive Office of the President and the Department of State to make "... more purposeful use of international science to help fulfill scientific objectives in the context of broad national needs and goals as defined by the Administration and Congress."

The National Science Foundation supports cooperation between U.S. scientists and engineers and their foreign colleagues to achieve three related objectives:

1. To facilitate access, by U.S. scientists and engineers, to unique research facilities and outstanding foreign scientists and engineers, particularly in cases where: (a) the level of excellence and achievement in a specific field equals or surpasses that of the U.S., (b) unusual or unique research facilities or environments are available, and (c) the magnitude of effort and resources required in a particular field favors or necessitates cost sharing.

2. To facilitate study of large scale natural phenomena (such as atmospheric and oceanic circulation) that transcend national boundaries and thus define research fields that are intrinsically international.

3. To help advance specific U.S. foreign policy objectives, as defined by the President, the Secretary of State, and the Congress.

In addition to supporting science and engineering research projects, the National Science Foundation is required by law to collect, analyze and disseminate a wide variety of research and development (R&D) data, for example, on resources, investments, science and engineering personnel, patents, and publications. These data are published biennially in the National Science Board's Science Indicators series, as well as in other interim publications.

Steps were taken during 1984 to increase the scope of the Foundation's international data collection and analysis program, particularly for Western Europe, Japan and the Soviet Union. NSF also assists the OECD in its data collection and analysis efforts and with standardizing definitions of various classes of R&D data to facilitate better cross-national comparisons. In a related activity, the Foundation has been working through a counterpart organization in the United Kingdom to enhance the exchange of data between the two countries and to improve the quality of empirical data resources in the social sciences.

In 1984, the National Science Board, which establishes policies for the Foundation, conducted a qualitative "areas of excellence" survey of scientific society officials, science officers at U.S. embassies abroad, and science officers at selected foreign embassies in Washington. This survey was designed to identify outstanding foreign centers in specific scientific disciplines. The Foundation is exploring means to broaden and refine that pilot study.

Approximately 20 percent of 12,000 research grants awarded by NSF have an international component, ranging from support for U.S. scientists and engineers to participate in international meetings to participation in large multilateral collaborative research projects.

These grants can be divided into three categories:

1. Grants whose international implications are essential to the research of a U.S. scientist. This category, which accounts for the largest number of NSF grants with international components, receives support from the full range of NSF disciplinary units - engineering, the mathematical and physical sciences, the biological, behavioral, and social sciences.

2. Grants for research in fields where the scientific problems are typically regional or global in scope and thus dictate research programs that transcend national boundaries. This includes research supported by NSF units in earth, polar, ocean, and atmospheric, sciences, and also in some of the social sciences, particularly economics.

3. Grants in which cooperation with a foreign scientist or institution is essential and which meet the mutual benefits terms or the more than 30 bilateral science and technology agreements managed by NSF's Division of International Programs (INT).

Grants with International Implications

These international activities include:

- Activities at a broad range of foreign research laboratories and institutes which foster international collaboration, such as the European Center of Nuclear Research (CERN) in Geneva, various institutes of mathematics, the Organization for Tropical Studies in Costa Rica, the Building Research Institute in Tskuba, Japan.

- Field studies and expeditions outside the United States.

- Long-term research collaborations involving joint planning and execution of projects and associated staff and student exchanges.

- Sabbaticals for U.S. researchers abroad.

- Visits of foreign scientists and engineers to U.S. institutions.

- Participation by U.S. scientists and engineers in international meetings.

The relative importance of these activities to U.S. science varies with the requirements of the disciplines, as evident from a sampling of currently supported activities.

Engineering

Traditionally, most of NSF's support for international work in engineering involves participation in international meetings and short term visits to foreign centers. During 1984, international engineering activities were dominated by projects involving five countries: Japan, the United Kingdom, West Germany, the People's Republic of China (PRC), and France. Cooperation with Japan and the PRC in earthquake hazard mitigation is carried out, in part, under formal bilateral agreements.

Two fields dominate international engineering activities with industrialized countries: automated manufacturing in institutions in West Germany, the United Kingdom, and France; robotics and artificial intelligence in Japan, the United Kingdom, and France.

Other international engineering projects include studies of sediment transport mechanisms in rivers in Pakistan and the PRC and remote sensing from space with Egypt and Pakistan.

In view of the excellence of engineering abroad and the critical role U.S. engineers play in the nation's international competitive position, the National Science Foundation is focusing greater attention than in the past on the international dimensions of engineering. A reorientation of the Foundation's entire engineering effort was initiated during 1984. Objectives identifitied for the international components include:

- Sharing research (including the design, cost, and operation of research facilities) with all countries in areas where such cooperation can lead to widely-shared benefits. These include mitigation of the effects of natural hazards, such as earthquakes,

landslides, wind, and flood, and man-made hazards, such as chemical wastes, nuclear wastes, and atmospheric pollution.

- Exploring means for more focused cooperation among Western nations on engineering research underlying the economic strength of these nations. Areas of interest include communication, information technology, transportation, natural resource exploration, and industrial productivity.

Basic Science

A wide variety of modes characterize the National Science Foundation's support for international activities in the sciences.

In physics the major impetus is the uniqueness of some foreign facilities. The expense and complexity of the facilities required for particle physics make international cooperation a necessity. NSF supports the work of U.S. high energy physicists in international centers such as CERN in Geneva, the Deutsches Elektron Synchrotron in Hamburg, and the KEK High Energy Physics Laboratory in Japan. Also, along with the Department of Energy, NSF contributes support for some of the experimental apparatus used by these physicists. Likewise, counterpart organizations abroad support the activities of foreign physicists at U.S. elementary particle research centers such as the Cornell Electron Storage Ring (CESR) Laboratory, the Fermilab near Chicago, and the Stanford Linear Accelerator Center (SLAC).

Collaborative international efforts are becoming more common in intermediate energy nuclear physics which is increasingly characterized by the complexity of instrumentation. Instrumentation and facilities in other areas of physics and in chemistry and materials research, while complex, are rarely so expensive as to require international cost-sharing. However, there are many unique facilities and excellent people working in these fields abroad, particularly in the industrialized countries.

Person-to-person exchanges are also essential in fields where costly facilities are normally not required, including mathematics and the social and behavioral sciences, such as economics, sociology, and psychology. A measure of the extensive network among world-class mathematicians, for example, is that in 1983, 28 percent of all co-authored publications in the field were co-authored by mathematicians from different countries.

Cellular and molecular biology also emphasize person-to-person exchange. The Williamsburg Economic Summit of June 1983 designated biotechnology as one area for cooperative research in recognition of its importance to the combined future economic strength of the member nations. Cellular and molecular biology are significant to further advance in biotechnology, and more international efforts may be encouraged.

Support for international cooperation in astronomy shares some of the characteristics of other physical sciences. U.S. and foreign astronomers cooperate in studies of stars, stellar evolution, and solar astronomy, and in the development of instrumentation to facilitate those studies. However, astronomy is also geography-dependent. Almost half of all astronomical objects cannot be observed from the Northern Hemisphere. NSF supports the Cerro Tololo Interamerican Observatory in Chile and the use by U.S. scientists of this and other astronomical facilities in the Southern Hemisphere.

Support for research in more than fifty countries characterizes NSF activities in the field sciences for studies of unique physical, biological, and social systems throughout the world. In the earth sciences, for example, NSF funds U.S. scientists conducting research in sedimentology in Australia and South Africa, Precambrian microfossils in Sweden and Greenland, stratigraphy in Kenya, uplift in the Himalayas, heat flow in Brazil and Botswana, and the geochemistry of sulfide deposits in Western Europe. A new multilateral study being supported in part by NSF will focus on the East African rift and will involve scientists from the U.S., the U.K., Sweden, West Germany and Switzerland.

During 1984, NSF awarded grants to U.S. anthropologists to conduct studies in 50 countries, a far larger number than covered by any other scientific discipline. In systematic biology and ecology, NSF supports field research by U.S. scientists in more than a dozen countries, including Mexico, Ecuador, Brazil, Venezuela, and Australia. A major effort in these fields focuses on the Organization for Tropical Studies in Costa Rica, a consortium of more than 27 institutions which NSF has supported for more than 20 years.

In the field sciences, many countries are becoming restrictive of foreign scientific research within their borders. For this reason U.S. scientists working in these disciplines rely on information and assistance provided by

foreign service personnel in U.S. embassies abroad and by the Department of State in Washington. The long-term collaborations, often stimulated by bilateral arrangements for scientific research, also encourage access by U.S. scientists.

Global or Regional Scientific Research

It has become increasingly important to the advance of science to study problems in fields such as the earth, ocean, atmospheric, and polar sciences on a regional or global scale.

These transnational or intrinsically international fields share a number of characteristics from their global nature. First, the research frequently requires expensive facilities and complex logistical arrangements. Such research often involves coordination between the National Science Foundation and other federal agencies (including NOAA, NASA and the U.S. Geological Survey) and the support of U.S. scientists in projects organized under auspices of non-governmental multilateral organizations, such as the International Council of Scientific Unions (ICSU).

Second, several so-called less developed countries are now more fully developed in these fields, suggesting cooperation among more countries. Mexico and Colombia, for example, now have between them four of the most modern oceanographic vessels in the world.

Third, the access issue noted in connection with the field sciences, is also a significant factor in these transnational scientific disciplines. This is particularly so in the earth, atmopheric, and ocean sciences where many nations have sought to widen their national jurisdiction to include space and coastal waters.

The entire U.S. Antarctic Research Program, which involves several other Federal agencies, is managed by NSF. Research in the Antartic is conducted under an international agreement among 31 nations. A significant portion of NSF's Arctic research program also involves international cooperation with Canada, Denmark (in the case of research in Greenland), and with Norway (in Svalbard). Cooperative efforts in the Arctic are likely to become increasingly important as the U.S. five-year research plan required under the terms of the Arctic Research and Policy Act of 1984 (Public Law 98-373) is implemented under NSF's leadership.

The new phase of the Ocean Drilling Program,* whose U.S. component is supported by NSF, provides an excellent example of the mutual benefits that can be derived from a scientific program conducted fully as a multilateral cooperative venture. France, West Germany, the U.K., Japan, and Canada are all participating in planning for the new program, and it is anticipated that a consortium of smaller countries will also participate through the auspices of the European Science Foundation.

While the focus of the earth sciences has traditionally been grants to individual investigators, regional and global studies are becoming more important. NSF is involved in a major new study of the continental lithosphere and in the planning of a new global seismic network.

Grants Under Bilateral Cooperative Science Program

Over the last two decades, the Foundation has become the executive or lead agency responsible for more than 30 bilateral science agreements with foreign governments or counterpart organizations around the world.

Two goals dictate the wide range of NSF-supported bilateral cooperation. The first is to advance the national interest by strengthening science and engineering in the United States and maintaining their vitality. The second is to contribute to and strengthen U.S. foreign policy and international relations.

INT, an element of the NSF Directorate for Scientific, Technological, and International Affairs (STIA), is charged with specific responsibility for bilateral cooperation and coordination related to these activities with the Office of Science and Technology Policy (OSTP) and the Department of State (DOS).

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* See also Chapter 10, section on "Ocean Drilling Program".

Currently, INT consists of the U.S.-India Initiative Program Office, the NSF Tokyo Office, and three operating sections grouped according to the level of scientific or technological advancement of the foreign country involved or some particular political or organizational concerns.

Regions or responsibility for the Industrialized Countries Section include France, Belgium, Italy, Spain, Germany, Switzerland, Scandinavia, United Kingdom, Japan, Australia, New Zealand.

Areas included in the Developing Countries Section are India, Pakistan, Sub-Saharan Africa, and Science for Developing Countries (SDC) Program, S.E. Asia, Latin America, the Saudi Arabian National Council for Science and Technology (SANCST) Office.

The Special Programs Section manages cooperative science programs and activities with countries which have centrally managed economies. These include China and the countries of East Europe. This section also has responsibility for programs and activities which are Division-wide, and in some cases, Foundation-wide, in nature -- assessments of science and engineering strengths abroad, identifying opportunities in cost and resource-sharing that can benefit U.S. science, and evaluation of NSF international activities. This section also supports international organizations, provides liaison with them, and staffs advisory committees to the Foundation in international matters.

Illustrations of Bilateral Activities:

Industrialized Countries

W. Europe

Until 1979, NSF formal arrangements with W. Europe included the U.S.-Italy Cooperative Agreement established in 1968 and the U.S.-France Postdoctoral Exchange Program established in 1970. A 1977 NSF Advisory Council Task Force strongly recommended strengthening U.S. science by increasing cooperation with countries which have centers

of scientific excellence. Thus, beginning with Switzerland in 1978, the NSF concluded bilateral agreements with Belgium, United Kingdom, West Germany, Sweden, and Finland and substantially restructured the U.S.-France Programs. In 1984, Austria was added.

These programs have contributed significantly to strengthening and expanding the scientific ties of the U.S. science and engineering communities with W. Europe. For example:

France

France is a world leader in some areas of robotics research, such as tactile sensors and adaptive controls. A recent award under the U.S.-France Cooperative Science Program allowed organization of a joint workshop on advanced automation and robotics. Participants agreed on joint research in the immediate future in tactile and proximity sensors and the development of robot vision systems.

Italy

Italian scientists have developed a mathematical model for understanding the formation and growth of fine droplets (aerosols) in the upper atmosphere. Under the U.S.-Italy Cooperative Science Program, a device was completed for measuring light scattering caused by small aerosol particles; it is especially useful in estimating the ratio of sulfuric acid to water in the atmosphere. In addition, Italian researchers developed software to assist the U.S. group to read taped observations of the aerosols resulting from the eruption of El Chichon in the spring of 1982.

These expanded arrangements with W. Europe have also brought NSF a role as a participant in pan-European science and technology policy fora including: annual meetings of the European Science Foundation; Science Mini-Summits, which provide forums for discussion between the Director of NSF and his European counterparts; follow-ups to the Versailles and Williamsburg summits, and EEC, NATO, and OECD activities.

Japan

Japan is NSF's oldest bilateral partner. Begun in 1961, it has become a model for the others. Collaborative work in emerging areas is strongly encouraged. For

example, a microbe called Halobacterium is already well-known among cell biologists for its remarkable purple membranes which can convert light into chemical energy. A recent cooperative research project focused on the molecules involved in this transfer of light energy. Use was made of a unique spectrofluorometer available in the Japanese lab, contributing to basic understanding of energy conversion reactions.

In addition to encouraging collaborative work, the agreement has also led to large, topic-focused programs in the Foundation, including earthquake engineering, and more recently, photosynthesis.

In February 1984, the Program arranged the third U.S.-Japan science policy seminar. These seminars allow NSF a unique view of both the research structure in Japan and such science policy issues in Japan as university-industry relations.

Developing and Industrializing Countries

It is to the countries of W. Europe and Japan that U.S scientists most frequently turn for partners for the reason that their capabilities are generally closest to our own. But other countries, such as China, Brazil, India have made impressive strides in developing their own resources in science and technology, and they have in some areas become attractive partners for our scientists.

Brazil

The NSF agreement with Brazil goes back twelve years. There is awareness that Brazil offers an enormous outdoor laboratory for scientists interested in science problems of the tropics. The Brazilian Amazon Flora Project includes the most comprehensive effort made to survey rainforest species in order to find out how to deal with the fragile ecosystems threatened by urban and industrial development.

But there are several other areas in which Brazil has excellent scientific capabilities. In the basic sciences, the leading example is perhaps the range of work at the Institute for Pure and Applied Mathematics: dynamical systems, topology, mathematical economics, complexity theory, among other areas. In physics, the strongest groups are in solid state physics, but the University of Campinas is a center of excellence in cosmic ray physics.

In the geosciences, Brazilian capabilities in stratigraphic analysis, geologic mapping, and metallogenesis strongly complement U.S. interests. A productive 1984 program development workshop in the geological sciences identified more than twelve areas in which cooperation would be mutually beneficial.

University-industry cooperation was a major focus for discussion during the visit by the Director of NSF to Brazil in 1984. A program for cooperative research between university-based innovation centers in both countries is being planned.

India

The most recent major role the NSF Division of International Programs has played in a government-wide activity is in the Indo-U.S. Science and Technology Initiative which grew out of discussions between President Reagan and late Prime Minister Gandhi on the occasion of her visit to the U.S. in July 1982. This initiative is discussed more fully in Chapter 4, section on "India", and also in Chapter 14, "Indo-U.S. S&T Initiative".

Other Developing Countries

NSF activities with Brazil and India are logical and long-planned extension of NSF programs in developing countries: science education activities managed for AID; the Special Foreign Currency programs; the AID-funded and NSF-managed Scientists and Engineers for Economic Development (SEED) Program; INT's regional programs in Latin America and S.E. Asia.

Scientific opportunities are plentiful in some regions. For example, in the earth and biological sciences and in the chemistry of natural products, Sub-Saharan Africa provides one of the remaining least-disturbed environments.* There is also much basic research to be done to combat the health and hunger problems of this region.

For example, schistosomiasis is a widespread tropical disease which has prove extremely hard to eradicate. The microorganism that causes it spends part of its life cycle in aquatic snails; recent research has concentrated on attacking the snail hosts and there are few methods that are free of undesirable side-effects on man and other animals. This was the starting point for an international workshop on molluscicides, in cooperation with the Zambian

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*See also Chapter 4, section on "Sub-Sahara Africa".

National Council for Scientific Research, and held in Lusaka.

NSF interactions with AID provide other opportunities.* In the past year, INT has handled external review of AID research projects through organizing review panels. Through a Resource Support Services Agreement (RSAA), NSF maintains a roster of experts to provide advice on AID projects. This relationshop with AID helps the U.S. scientific community become aware of the special research needs of the LDC's, and, at the same time, improves the technical quality of AID's research program.

In addition, NSF is working jointly with the Egyptian Academy of Scientific Research and Technology (ASRT) to develop cooperative scientific activities.

Communist Countries

China

Current OSTP and DOS policy gives high priority to S&T cooperation with China. The five year U.S.-PRC umbrella agreements were signed between October 1978 and October 1981 involving about a dozen U.S. agencies. The NSF Director is a member of the U.S.-China Joint Commission, chaired by the Director of OSTP.

NSF's Division of International Program's responsibilites include: Foundation-wide coordination and facilitation of China-related activities and management of the cooperative science program.

With the mutual visits of President Reagan and Premier Zhao Ziyang in 1984, the U.S. and China reaffirmed their cooperative commitments. The White House continued to assign very high priority to the U.S.-China Cooperative S&T Program, urging maximum expansion within available resources.

In 1984, the scope of the program, previously limited to six fields of science, was expanded to encompass all fields of science, (including social science) and engineering normally supported by NSF. U.S.-China cooperative research activities have been expanding steadily, particularly in the social sciences and in the (civil and mechanical)engineering sciences. Opportunities for meaningful and mutually beneficial cooperation are becoming clearer and more numerous.

*See also Chapter 14, section on "Collaboration with the U.S. Scientific Community".

E. Europe*

NSF objectives for its E.Europe programs are to advance U.S. science through scientific cooperation with the centrally planned countries of E. Europe; to support U.S. foreign policy initiatives and goals; and to provide non-governmental channels for S&T contacts with Eastern Europe and the U.S.S.R. through the NAS Exchange Programs.

NSF stresses cooperative research activities with Hungary, focuses on bilateral seminars with Romania, and funds a modest level of activity with Bulgaria. NSF concentrates available resources on the most scientifically meritorious activities for the U.S.-Yugoslav Joint Board Program. Subject to U.S. foreign policy guidance and availability of additional funding, NSF has been discussing implementing the 1981 NSF-Polish Academy of Sciences MOU with targeted workshops to help identify suitable projects for subsequent joint research.

Scientific benefits from these programs continue to be high. For example, one project centers on designing and testing unusual motors called permanent-magnet synchronous linear machines (PMSLM's). These devices have the advantage of a large ratio of power to weight and contain no moving contacts. They show good prospects of application to robotics and automated manufacturing.

Overall, NSF manages some 30 multidisciplinary formal agreements and some 20 other informal arrangements for bilateral scientific cooperation. The Foundation participates in important interagency activities, such as the U.S.-India initiative. The NSF network of relations with industrial countries became firmly established over the last five years. The Foundation is on the cutting edge of activities in science and technology for development. NSF has established experience in the U.S.S.R., China, and Eastern Europe.

In November 1984, Dr. Edward A. David, President of Exxon Research and Engineering Company transmitted the report of an American Association for the Advancement of Science (AAAS) panel of experts which was established to review NSF bilateral cooperative programs. The panel found the scientific merits of NSF bilateral cooperative projects to be in the above-average to excellent range for the great majority of projects. The scientific and engineering research managed under these bilateral programs is of high-quality.

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*See also Chapter 4, sections on "Eastern Europe" and "U.S.S.R."

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APPENDIX I

CONGRESSIONAL RESEARCH SERVICE COMMENTS ON THE 1985 TITLE V REPORT, THE SIXTH ANNUAL REPORT, FOR 1984, SUBMITTED TO THE CONGRESS BY THE PRESIDENT PURSUANT TO SECTION 503 (b) of TITLE V OF PUBLIC LAW 95-426*

A. INTRODUCTION

The Presidential message and report for 1985 on "Science, Technology, and American Diplomacy" was sent to the Congress on March 20, 1985. The material summarizes events during 1984. The report, prepared by the Department of State, is the sixth in a series which began in 1980, pursuant to the requirements of Title V, "Science, Technology, and American Diplomacy," of P.L. 95-426, the Foreign Relations Authorization Act of 1979. This is the fifth Congressional Research Service (CRS) critique of the Title V reports. 1/

B. SUMMARY COMMENTS ON THE PURPOSES OF THE REPORT

Although the purposes of the Title V report were not spelled out in detail in section 503 (b) of Title V of P.L. 95-426, which mandates the preparation of the report, these purposes can be inferred from the language prescribing the report's contents and from section 503 (a), which defines the responsibilities of the President, the Secretary of State, and the Director of the Office of Science and Technology Policy. These include responsibilities to identify, evaluate, and assess foreign policies which have implications for domestic and international science and technology and international science and technology policies which influence domestic and foreign policy. The report is required to contain recommendations to guide Presidential and congressional deliberations. The statute specifies that the recommendations

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1/ The first annual report, "Science, Technology, and American Diplomacy, 1980," was published as a joint committee print by the House Committees on Foreign Affairs and on Science and Technology, as were the third annual report, "Science, Technology, and American Diplomacy, 1982," the fourth annual report, "Science, Technology, and American Diplomacy, 1983" and the fifth annual report, "Science, Technology, and American Diplomacy, 1984." The second annual report, "Science, Technology, and American Diplomacy, 1981," is a committee print of the House Committe on Foreign Affairs. CRS critiques were included in the first, third, fourth, and fifth committee prints of the series.

address: personnel requirements; standards and training for Federal employees dealing with foreign relations and science or technology; and the decision of whether existing bilateral and multilateral science and technology activities should be continued. This last recommendation is to be based on information giving: "(A) an analysis of the foreign policy implications and the scientific and technological benefits of such activities or agreements for the United States and other parties, (B) the adequacy of the funding for and administration of such activities and agreements, and (C) plans for future evaluation of such activities and agreements on a routine basis."

C. THE ORGANIZATION OF THE REPORT

1. CONTENTS

The Presidential message on "Science, Technology, and American Diplomacy, 1985" summarized personnel and management activities undertaken during 1984 by the Secretary of State to reinvigorate the agency's functions related to science and technology; highlighted several multilateral science and technology activities, including the work of the London Economic Summit and the NATO science committee; and reviewed the status of bilateral science and technology cooperation with Japan, China, India, and the Soviet Union.

The accompanying Title V report opened with a policy statement and was followed by a chapter describing recent actions taken by the Department of State to improve its resources and capabilities to deal with science and technology. This is the second consecutive year in which the State Department's activities have been described in detail--facilitating congressional oversight of these improvements. Several multilateral activities were inventoried next: the Summit science and technology initiative, and work in the Organization for Economic Cooperation and Development (OECD), the United Nations Educational, Scientific, and Cultural Organization (UNESCO), and the North Atlantic Treaty Organization (NATO) Science Committee.

The next chapter illustrated some of the activities conducted under 18 bilateral cooperative science and technology programs.

The last section of the report, which comprises its bulk--almost 80 percent--consisted of chapters describing international science and technology cooperative programs in 11 substantive areas, including agriculture; civil space; energy; environment, natural resources, and population; health; oceans and polar affairs; telecommunications; transportation; defense; science and technology for development; and basic science and engineering. These chapters generally gave details on the foreign science and technology activities of relevant Federal agencies, on activities mandated by various treaty obligations, and, in some instances, on bilateral activities. A criticism made of the first five Title V reports was that activities of the Defense Department were not included. This year, for the first time, reference was made to the international cooperative science and technology activities

of the Department of Defense. However, the section was so superficial as to provide little useful information.

The 1985 Title V report includes an index, which provides cross-references by country, region, and international organization. This is a useful tool, which, undoubtedly, will facilitate use of the report.

2. COMMENTS ON THE CONTENTS OF THE REPORT

The section on bilateral cooperative activities contains many of the same weaknesses identified in previous years. Although the United States has concluded over 50 bilateral agreements for science and technology cooperation, only 18 were discussed. Some bilaterals were covered last year; others were not. There were no criteria listed to explain why some agreements were surveyed and others were not. In addition, because there was no list of all the agreements maintained by the United States, the reader cannot identify such commitments and has no way of ranking their importance. Does the absence of coverage of a bilateral science and technology agreement mean that no activities were conducted under the agreement, or that the agreement was less important than the activities that were described?

Like the previous Title V reports, there is considerable variation in the scope of information conveyed in the descriptions of bilateral activities. Some descriptions appear to meet the requirements of the statute, but on the whole, most of the material on bilateral activities merely illustrated, or gave anecdotes about, some of the recent activities conducted. Because these sections, for the most part, did not give the information required by statute--on the foreign policy implications and scientific and technological benefits of such activities, on the adequacy of funding, or plans for future evalution of such activites on a routine basis--it seems apparent that neither the Congress nor others can use the document for policy planning, oversight, or to compare program changes or progress over time.

D. FUNDING

1. COMMENTS

Apparently most of the agencies which had funding data readily available reported them. In fact, some parts of the report contained sections devoted to "resources"; other sections reported funding data for each separate activity as it was being described. For instance, the Department of State reported that 26 of 35 science counselors and attaches were funded by the Department at a cost of $2.5 million; budget figures were also given for the Bureau of Oceans and International Environmental and Scientific Affairs (OES). The State Department also reported appropriations totaling $8.876 million for 1984 for the activities of 12 international Fisheries Commissions.

Some of the funding for bilateral activities was summarized. For instance, the Department of State reported the appropriations it was authorized in 1984 to support programs with Yugoslavia ($1.683 million) and Poland ($2 million). Funding was also reported for bilateral activities with Spain ($7 million), Israel ($65 million), and India ($110 worth of U.S. held rupees). For the most part, however, the costs of bilateral activities were not reported. Funding data were not reported in the discussions of bilateral cooperative activities with China, Korea, Japan, Thailand, Indonesia, France, Nigeria, Pakistan, Sri Lanka, Canada, the Soviet Union, Mexico, and Brazil. The document would be more useful if the authorities to appropriate funds for bilateral activities were clearly identified in the report and if the special circumstances warranting funding of dollars and use of special foreign currency funds were summarized.

As in previous years, the reporting of funding details was uneven in the chapters on foreign and international activities. For instance, chapter 12 on transportation, which is typical, did not report separate program costs and noted that they could not be easily identified:

> DOT does not have a special appropriation for carrying out international activities. Salaries, travel, research, and administrative costs are either (1) borne by the participating DOT entities from domestic program funds or (2) funded through arrangements with other government agencies or reimbursable technical assistance agreements with foreign governments. . . . Except where noted, figures on expenditures of U.S. funds for international activities cannot be precisely calculated.

Nevertheless, despite the lack of information about funding, the agency concluded that: "DOT believes an adequate portion of its administration and R and D budgets is available for major international cooperation activities commensurate with benefits to be gained in light of its domestic priorities."

Some of the chapters on substantive activities contained extremely detailed budgetary information. For instance, the section on agriculture gave precise fiscal year 1984 cost figures for the activities discussed. It reported that the U.S. Department of Agriculture budgeted $8,000 for scientific and technical cooperation between Argentina and the United States in the fields of agriculture, livestock, and forestry in fiscal year 1984. This kind of information is very useful. However, it appears that only a few of the agricultural activities and budgets were summarized. The Agriculture Department listed other funding obligations for foreign and international cooperative activities, identified only by title, totaling at least $15 million, far in excess of the expenditures for the few activities described in some detail.

The chapter on space contained detailed technical data about exchange activities, but only bits of information summarizing program costs. The chapter on energy included some useful information on program costs for both American and foreign participants and some data on

the contribution of funds to international organizations, but such information was not given for all of the activities described. Virtually no useful financial information was given for costs of international environmental programs; yet the National Park Service provided detailed financial data describing its costs, the costs of other Government agencies and/or foreign governments for all the activities it described, ranging from international ecological research and monitoring to training and information exhange. The Department of Health and Human Services summarized budget figures for activities it surveyed. However, it did not give program costs for each of the specific activities described. The chapter on oceans and polar activities presented very minimal funding information, mostly scattered bits about program costs, for instance, dollar figures for U.S. budgets for the ocean drilling program, but nothing on domestic or international costs of ocean remote sensing. The Agency for International Development gave a dollar total for international program costs, but did not detail costs by activity. There was no useful information about funding in the chapters devoted to defense and international basic research activities.

2. CRITIQUE

The information presented in the 1985 Title V report on funding for international science and technology activities is the most detailed and comprehensive of any report to date. Yet, because there was no information on funding in most of the sections of this report, the report still does not conform precisely to the requirements of the legislation. Nevertheless, a policy statement in the beginning of the report noted that "The Administration . . . believes that its budget levels for FY 1985 are adequate for meeting our priority science and technology and foreign policy needs." No data were given to substantiate this conclusion. The report did describe funding for a few of the activities included, but the report contained neither funding information on all the activities discussed nor an adequate summary of the public funds used to support these programs.

It is apparent that there are serious obstacles to reporting funding data fully. However, as the sixth Title V report demonstrates, some agencies do have the ability to provide funding data. The statutory requirements relating to funding will not be fulfilled fully until all agencies report funding figures and generate recommendations regarding the adequacy of funding. It is difficult to understand how the Administation can conclude, as it did, that budgets for international science and technology programs are adequate, without knowing what those program costs and budgets are. The ability of Congress to conduct proper oversight of these activities without knowing levels of program expenditures is greatly impeded.

E. EVALUATION

This report for the most part, like previous Title V reports, does not adequately fulfill the statutory requirements to include information on the ". . . plans for future evalution of such activities and

agreements on a routine basis." Evaluation activity was not even referred to in most of the sections of the report. When evaluations were mentioned, they generally were treated in a cursory fashion, with an indication that an evaluation of some kind was conducted or is planned, but without detail as to specific evaluation criteria or findings. The best, and virtually only, evaluation statement appeared in the chapter on international health. It indicated that all international activities were judged on criteria of scientific merit and for compliance with U.S. regulations, such as the protection of human subjects. The foreign partner's capability to conduct health activities was considered, and program reviews were undertaken as warranted by the Public Health Service's (PHS) internal review system before program renewal. However, PHS did not outline the criteria it uses to evaluate efficiency and effectiveness, nor did it enumerate the factors of foreign policy or scientific achievement used to evaluate programs.

F. DISCUSSION OF SCIENCE AND TECHNOLOGY BENEFITS

The discussion of science and technology benefits generally was more detailed and informative in this report than in previous reports, but the coverage was not uniform and often was vague. Some of the discussions of bilateral and international activities described impacts on U.S. and foreign scientific and technological progress in detail, and others conveyed only general statements and no detail.

This problem is all the more serious because it appears that a high degree of selectivity was used in determining which cooperative activities to describe in the report. The selective representation of activities, coupled with a less than complete statement of impacts on science and technology, means that this report does not conform to the statutory requirements to ". . . report. . . recommendations with respect to . . . an analysis of the scientific and technological benefits . . . of such activities or agreements for the United States and other parties"; nor does it develop a data base which might be used for oversight purposes.

A representative example of this problem appeared in chapter 5, "Agriculture in International S&T Cooperation." The chapter opened by identifying three goals of cooperative activity: "(1) improvement of the productivity of U.S. agriculture, (2) conservation of agricultural resources, and (3) maintenance and expansion of U.S. agricultural export markets." It then identified specific activities under each goal by describing cooperative programs with three countries under the first goal and with two countries for both the second and third goal. Program costs were even given for some illustrations, specific down to the thousand dollar level. However, it is obvious that the programs discussed represent merely a small sampling of the Agriculture Department's activities to fulfill these three goals since, as was explained above, the chapter concluded with a listing of the costs of the agency's other cooperative programs, totaling over $15 million in annual costs. No details were given for these.

Another example of a vague statement of science and technology benefits dealt with U.S. energy cooperation with the People's Republic of China:

> In the area of High Energy Physics (DOE), excellent progress has been made in the planning and design of the Beijing Electron Positron Collidor (BEPC). BEPC was officially designated as a key project by the government of China in 1983, thereby moving its completion date to 1987 rather than the projected 1988.

This statement is inadequate to the extent that it did not describe the U.S. contribution to the project, the actual exchange activities involved, or the benefits to U.S. science or foreign policy.

An example of a more detailed, and potentially more useful, statement of science and technology benefits appeared in the discussion of the NATO Science Committee:

> The Committee continued its programs to facilitate cooperation and exchange of information between scientists in NATO countries and to stimulate research in new areas of science. These programs, highly respected by the scientific community, are financed by a $16M budget.
>
> . . . . American scientists and institutions continue to derive significant benefits from the Committee's programs, with over 50,000 U.S. scientists having participated during the years the programs have existed. Many foreign recipients of fellowships choose to continue their research in U.S. universities, giving the U.S. the benefit of their experience.

In addition, this section gave selected details about the number of scientists participating in NATO science activities. It did not, however, identify all activities, notable breakthroughs, or titles and numbers of papers published.

One of the better efforts made in the paper to identify specific science and technology (and foreign policy) goals served by these international programs was made in chapter 7 on energy. One illustration of this kind of discussion deals with the Nuclear Regulatory Commission's cooperative research arrangements with other countries. It outlined mutual benefits expected and the specific kinds of benefits the United States seeks to derive from interactions with other countries:

> Research arrangements . . . both general and program-specific, often provide for the participation of other countries--through the transfer of money, personnel, equipment, where they gain immediate access to the research results or participate in the development and advancement of related computer codes. In this period of diminishing budgets, such cooperative research projects allow all

participants to make maximum use of their research dollars by pooling resources and coordinating planning to avoid duplication of effort. NRC is currently engaged in 37 safety research agreements with 17 countries (Austria, Belgium, Canada, Denmark, Finland, France, Netherlands, Norway, Spain, Sweden, Switzerland, Taiwan, the United Kingdom) and 2 international organizations (the European Communities and OECD). These agreements allow for the substantial expansion of NRC's ongoing research programs. They also provide for NRC's reciprocal participation in the research programs of other countries, which are advancing with great strides in both quality and quantity. For example, most of the nuclear safety test information in the area of thermal hydraulics will, in the future, come from such large facilities as ROSA-IV in Japan, UPTF in Germany, and facilities under construction in France and Italy.

There are several other examples of discussions of science and technology benefits which conform more closely to the requirements of the statute. These include, for example, the discussion of benefits to U.S. science and technology that appeared in the section dealing with bilateral energy cooperation with the Federal Republic of Germany and Switzerland; many of the items covered in chapter 8, dealing with environmental pollution, for instance, the discussion of specific transborder pollution problems with Mexico and activities intended to cope with them; chapter 10, that deals with oceans and polar affairs; chapter 14, on science and technology for development, in which there were substantial efforts to link specific developmental activities to U.S. foreign policy objectives; and the discussion in chapter 15, on basic science and engineering, which described scientific areas in which other countries surpass the United States, and efforts made to transfer that knowledge for the benefit of U.S. researchers (for instance, France, robotics; Italy, aerosol particle research; and Japan, biological energy conversion techniques).

G. DISCUSSION OF IMPLICATIONS FOR FOREIGN POLICY

This report, like the previous five Title V reports, lacks a totally candid and complete discussion of the foreign policy implications of the science and technology activities discussed. This problem was criticized in previous reports and in hearings held by the House Committee on Foreign Affairs in 1983. 2/ While some of the

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2/ See, for instance, Knezo, Genevieve J. Congressional Research Service Critique of the 1984 Title V Report, The Fifth Annual Report, for 1983, Submitted to the Congress by the President Pursuant to Section 503 (b) of Title V of P.L. 95-426. In U.S. Congress. House. Committees on Science and Technology and on Foreign Affairs. Science, Technology, and American Diplomacy, 1984. Fifth Annual Report Submitted to the Congress by the President Pursuant to Section 503 (b) of Title V of P.L. 95-426. Washington, U.S. Govt. Print. Off., 1984, p. 166. Joint Committee Print.

analysis of foreign policy implications in the 1985 report was better than in the last report, most of the discussion of foreign policy was very vague and rhetorical, and often did not mention troublesome foreign policy issues that might affect the scope and direction of scientific and technical cooperation. For example, the following excerpt describes the Allied Summit initiated program of science and technology cooperation:

> The London Summit Meeting of the Heads of State or Government of the United States, Canada, France, the Federal Republic of Germany, Italy, Japan, the United Kingdom, and the President of the Commission of the European Communities reaffirmed the importance of science and technology as an essential component of international cooperation . . . .

This statement leaves many questions unanswered. What kinds and processes of cooperation are being emphasized: sharing of facilities, personnel exchanges, cooperative funding? What are the expected foreign policy implications of these programs?

Some other oversimplified statements of foreign policy implications appeared in the sections on multilateral scientific and technical cooperation in the Organization for Economic Co-operation and Development (OECD) and the North Atlantic Treaty Organization (NATO). The discussion of scientific and technological activities in UNESCO did not mention the State Department's request for appropriations for fiscal year 1986 to fund directly some of the international scientific activities that the United States used to participate in via UNESCO. The budget details of these proposals were made known long in advance of the publication date of this report. In addition, there was no discussion in the report of the potential impacts of U.S. withdrawal from UNESCO on U.S. science.

Several of the statements of foreign policy implications that appeared in the chapter on bilateral activities raise more questions than provide answers. Discussions about cooperation with Japan alluded to the need to improve science and technology relationships, but did not mention the growing scientific and technological competition between the United States and Japan. No attempt was made to identify foreign policy objectives or implications in the discussion of cooperative activities with Mexico or Brazil.

The chapter on international health described the content of some exchange activities with China, Egypt, India, Israel, Japan, Korea, Mexico, Poland and the Soviet Union, but it did not identify the specific foreign policy goals, objectives, or implications of these activities.

There are several examples of better defined statements of foreign policy implications, for instance, in the discussion of Antarctic science and technology activities and their political and scientific

origins--the International Geophysical Year and the Antarctic Treaty System, respectively. Foreign policy objectives also were well-defined in the statements on bilateral cooperation with Thailand, Indonesia, Yugoslavia, and Spain. For example, regarding cooperation with Indonesia, the report said:

> Activities which promote Indonesia's economic and industrial development are vital to its continued political stability, and thus are important U.S. policy objectives.

As another example, regarding Spain, the report noted, that the U.S.-Spanish science and technology agreement was a diplomatic initiative concluded as part of the agreement to continue to maintain U.S. Navy and Air Force installations on Spanish soil.

This report seems to lack a clearly enunciated hierarchy of foreign policy implications of science and technology cooperation. This makes it difficult to categorize or define the specific benefits of the cooperative activities described. It also generates some confusion. For instance, when discussing bilateral cooperation with industrial countries, the report said ". . . the pursuit of bilateral S&T cooperation with the industrialized world is not dependent on formal agreements." The implication is that cooperation is sustained by good science and acceptable political circumstances. The report also noted that more formal government-to-government agreements will be required as research becomes more expensive. But why then does the United States maintain the multitude of formal cooperative technical agreements, some of which are discussed in this report, to sanction cooperation in specific substantive areas with Western European countries? One example is the agreement with the Federal Republic of Germany for cooperation in urban bus technology, highway engineering, and operations research, discussed in chapter 12 on transportation. It may be that such agreements are required for diplomatic purposes--to facilitate diplomatic exchange and paperflows. However, since scientific and technological cooperation with the United States is often considered an important factor of harmonious international relations, technical agreements like this may have some additional symbolic meaning or inherent political value that countries prefer to have recognized and noted. The foreign policy and diplomatic factors that have mandated the signing of agreements should be defined better.

H. CONCLUSION

1. COMMENTS

While the 1985 "Science, Technology, and American Diplomacy" report complies more closely with the statutory requirements of Title V of P.L. 95-426 than any of its predecessors, the report, overall, still falls short of meeting all requirements stated in authorization law. An attempt was made in some of the sections of the report to evaluate an activity in terms of personnel needs, foreign policy implications and benefits, scientific and technological benefits,

and evaluative activities, but such information was not uniformly reported and did not always convey the kinds of details specified in the statute. These shortcomings have been criticized in other reports.

There seem to be several reasons why these shortcomings warrant special attention. One is that that this year's report, at 192 pages, is the longest of the six reports issued to date. Another reason is that it is apparent that staff of many Federal agencies devoted considerable time and effort to compiling the information, and that State Department officials edited a long and complex manuscript. Despite this effort, the report, while presenting considerable detail, history, and perspective about some issues, typically gave only selected, illustrative, often anecdotal information about most programs.

Previous CRS commentaries have noted both the difficulty the State Department encounters in giving candid explanations of foreign policy objectives of such activities and also the inability of agencies to identify precisely the amount of dollar support allocated to international science and technology activities because international activities are often funded out of domestic science budgets.

But, because much of the report merely illustrated, rather than summarized, the foreign and international activities depicted, it does not give Congress an information base to evaluate programs and policies over time. Nor did it describe how much money was spent on personnel devoted to or exchanged in international scientific and technological activities. It does not provide an information base to evaluate the foreign policy objectives of such activities. And, due to the absence of information about evaluation objectives and plans, it does not provide assurance to Congress that the executive branch is adequately examining the accomplishments and effectiveness of these programs.

2. OPTIONS

The committee may want to consider the following options. It may be appropriate in the future to shorten the Title V report by rotating coverage of bilateral and multilateral activities, so that only part of these activities are covered annually. However, this should be done systematically to prevent exclusion of important activities. Reference was made in this report to the fact that many technical agencies prepare separate annual reports describing some of the bilateral and multilateral activities covered. Perhaps these could be inventoried or cited.

In addition, the reporting requirements specified in Title V of P.L. 95-426 lend themselves to development of a common reporting format, containing the elements that the Congress determined were essential to implementing the legislation. Although there is more evidence this year than before of use of a common reporting format, such a format was not used systematically. In order to overcome some of the deficiencies of the Title V reports, it may be appropriate for the State Department to require use of a common reporting format.

The committee might want to present the State Department with a draft working statement of the kinds of foreign policy goals and scientific and technological achievements it would like to see discussed and the criteria it has determined relevant to evaluation of these activities.

For example, a discussion of scientific and technological benefits to participating nations might include:

- singularity or mutuality of benefits to the participants;
- contribution to the accumulation of scientific knowledge;
- estimates of the number of persons exchanged, including their locations, purposes, and duration of visit;
- discussion of kinds of research conducted, breakthroughs accomplished, data gathered, and papers or publications produced;
- identification of the kinds of data collected or produced and the unique conditions which warranted data collection using this kind of research arrangement;
- estimate of the number of students and young scientists exposed to the activity;
- degree of cost-sharing of costly research facilities, laboratories, and data sets;
- access to unique population cohorts or scientific and environmental conditions unavailable in the United States;
- potential for saving U.S. and foreign lives;
- development or harmonization of international standards, measures, and regulations; and
- contributions to the preservation of unique scientific, natural, or historical resources.

Some science and technology activities might be expected to be purely exploratory or represent program planning or diplomatic interchange, without tangible accomplishments expected. These could be identified and evaluated separately.

The reporting format for diplomatic or foreign policy implications might deal with such factors as:

- strengthening regional or alliance relationships against common adversaries;
- influencing the opinions of public and scientific elites, or mass public opinion;
- exposing foreign scientists to U.S. culture, scientific methods, and democratic ideals;
- influencing the opening up of foreign markets to U.S. industry,
- developing bilateral or multilateral agreements which provide Americans with access to foreign research sites;
- facilitating international agreements on issues at the intersection of science, technology, and foreign policy;
- meeting humanitarian motives;
- demonstrating and maintaining U.S. prestige and leadership; and
- providing technical assistance.

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